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ABSTRACT

This document is a collection of author abstracts of 129 papers scheduled for presentation at the 1973 Minneapolis convention of the American Association for Health, Physical Education, and Recreation. The papers are roughly grouped in clusters according to subject, but time limits and conflicting schedules prevented rigid subject content headings. The volume is author-indexed. (JA)

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ABSTRACTS

of Research Papers 1973

SP 006 702

Presented at the Minneapolis Convention of
the American Association for Health
Physical Education and Recreation

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PREFACE

This volume of Abstracts of Research Papers 1973 includes abstracts, precisely as submitted by the authors, of the 129 papers scheduled for presentation at the 1973 Minneapolis convention. Although an attempt was made to group papers by subject content, this was not always possible. Factors which interfered with such scheduling efforts included time limits imposed for individual sessions in relation to the number of papers dealing with a given subject as well as the necessity of avoiding conflicts with other commitments for those reporting studies.

The number at the bottom of the page in this collection of abstracts represents the number assigned to the study and is identical to the number appearing in the convention program. The time and date each paper will be presented are indicated in the lower left-hand corner of each page. The name and address of the author to whom inquiries for further information may be sent appear in the lower right-hand corner. An index of all authors is presented at the conclusion of this volume.

Helen Eckert
Abstracts Editor
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ACKNOWLEDGMENTS

The Program Chairman of the Research Section was extremely fortunate that many individuals gave unselfishly of their professional talents in the planning and conduct of the 1973 meetings. Considerable time and effort were expended in both the reviewing of studies submitted for presentation and the actual scheduling of papers. The willingness of a number of AAHPER members to preside at the meetings is also acknowledged. Special appreciation is extended to Robert E. Allen, Anne E. Atwater, David Auxter, Hugh W. Bonner, Barbara L. Drinkwater, B. Don Franks, Jerry Freischlag, Joseph J. Gruber, Bernard Gutin, Dorothy V. Harris, Owen J. Holyoak, Herberta Lundegren, Arlene Morris, Loren G. Myhre, John M. Pearson, John P. Raducha, Mary Ann Roberton, John A. Roberts, Erika Sander, Gary D. Sinclair, Waneen Wyrick, and M. Nadine Zimmerman.

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THE USE OF A PERCEPTUAL-MOTOR TEST AND A COGNITIVE ABILITY TEST TO CLASSIFY FIRST GRADE CHILDREN INTO READING GROUPS. Jerry R. Thomas and Brad S. Chissom; Georgia Southern College.

The purposes of this study were to: assess the relationship between two predictor measures, the Shape-O Ball Test* (perceptual-motor) and the Otis-Lennon Mental Ability Test, and two criteria, reading performance (reading group) and general academic ability (teacher rating); and attempt to classify subjects into reading groups using the predictor measures. Subjects were 48 first grade students reflecting the socioeconomic and racial make-up of the local community. Data were collected by using: the Shape-O Ball Test which measures shape discrimination, perceptual-motor match and fine eye-hand coordination; the Otis-Lennon MAT which is a non-verbal test of general mental ability; a complex teaching rating including reading, numerical, verbal and listening ability; and the reading group to which subjects were currently assigned. Results indicated that: (1) the perceptual-motor test was significantly correlated with the Otis-Lennon Test ($r = .71$), the complex teacher rating ($r = .71$), and the reading group ($r = .64$); (2) using canonical correlation, the two predictors, Shape-O Ball Test and Otis-Lennon MAT, were significantly related ($R_c = .841$) to the two criteria, reading group and complex teacher rating; and (3) the Shape-O Ball Test and the Otis-Lennon MAT could be used in a discriminant analysis to successfully assign the subjects to reading groups. It appears that these two objective tests are useful for placing children into the proper reading groups.

*Directions for this test available from authors.

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April 13, 1973
9:00 a.m.

BASIC COMPONENTS IN THE MOTOR PERFORMANCE OF CHILDREN SIX TO NINE YEARS OF AGE. G. Lawrence Rarick, University of California, Berkeley.

The purpose of this investigation was to determine the factor structure of motor abilitie of children in the age range six to nine years. Some 60 fine and gross motor tests were administered to 140 healthy boys and girls in attendance in an elementary school in the San Francisco Bay Area. The selection of the tests was based upon an hypothesized factor structure formulated from present knowledge of the motor abilities in man. Forty-seven of the 60 tests proved to be sufficiently reliable for inclusion in the final analysis. Intercorrelations among the test scores were calculated separately by sex and the inter-correlation matrices were factored by the method of principal components. Rotated factor loadings were obtained by Kaiser's Varimax analytic solution. The results of the factor analysis disclosed a well defined factor structure for both the boys and the girls. In the case of the boys eight factors were extracted accounting for 77.6 percent of the total variance. In the case of the girls the ten extracted factors accounted for 76 percent of the common variance. The single factor accounting for the greatest percentage of the variance in each sex was identified as a strength-power-body size factor. Other factors that were extracted in both sexes, identified by their respective factor loadings, were fine visual-motor coordination, speed and coordination of gross body movements, dead weight or body fat, balance, spinal flexibility in the antero-posterior plane, spinal flexibility in the lateral plane, and thigh-trunk strength.

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April 13, 1973
9:15 a.m.

THE CONSTRUCTION OF A MOTOR FITNESS TEST BATTERY FOR BOYS IN THE PRIMARY GRADES. James M. DiNucci, Northwestern State University and Roger Shore, Northwestern Junior High School.

In order to construct a scientifically designed evaluative instrument to assess the motor fitness of boys in the primary grades, 30 test items purported to measure muscular strength, muscular endurance, cardiovascular endurance, power, speed, agility, flexibility, and balance were administered to an incidental sample of 238 boys ages 6 to 9 years. An intercorrelational matrix was constructed for the factor analysis of the data using the principal axes method. Seven factors having eigenvalues above 1.000 and accounting for 65.17 percent of the variance were isolated. The first of two test batteries developed included the test items which loaded highest on each factor and were as follows: Clarke's strength composite; McCloy's endurance ratio; Well's sit and reach; Bass balance on a stick - lengthwise; wrist flexion and extension flexibility; arm flexion on the back flexibility; and modified push-ups. The second test battery, developed for more administrative feasibility, included items which loaded high on each factor and eliminated composite scores and ratios. The items in test battery II were: grip strength; 300 yard run; Well's sit and reach; Bass balance on a stick - lengthwise; wrist flexion and extension flexibility; arm flexion on the back flexibility; and modified push-ups.

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April 13, 1973
9:30 a.m.

THE FINE MOTOR PERFORMANCE OF CHILDREN AGED FIVE, SEVEN AND NINE YEARS, AND THE RELATIONSHIP OF THIS PERFORMANCE WITH SKELETAL AGE. Robert Kerr, Memorial University of Newfoundland.

The primary purpose of this study was to investigate the relationship between the performance of a fine motor task, by children of 5yr, 7yr and 8yr of age, and physical maturity as measured by skeletal age. The fine motor task was a reciprocal tapping task, performed by tapping with a dart between pairs of targets drawn on paper. The task being varied along the two perimeters of target width (W) and movement amplitude (A): where W = 3/8", 3/4", 1½", and A = 2½", 5" 10". A second purpose was to analyse the performance of the fine motor task and its relation to the age and sex of the subjects. Sixty Caucasian boys and girls attending private day care centers and elementary schools in the Eugene-Springfield, Oregon, area served as subjects. The three age groups selected were 5yr-7yr-9yr, and each age level included ten boys and ten girls. All subjects were tested within one month of their birthday to obtain some homogeneity in relation to chronological age. The data were collected during the winter and spring quarters of the 1971-72 academic year, and all the testing was done at the day care center or school the child attended. Radiographs of the left wrist and hand were taken for use in the skeletal age assessments. Correlations relating skeletal age to the fine motor task, using both regression coefficients and mean movement times to represent the performance of the fine motor task, indicated no consistent relationship between these variables. A three-way analysis of variance performed on the movement times yeilded significant F-ratio's, at the .001 level of confidence, for age differences and for differences between tasks. However, the differences between the sexes were not significant. Further analysis indicated that there was no significant difference between the slopes of the regression lines representing the motor performance of the three age groups. However, the differences in the intercepts for these regression lines were significant at the .01 level of confidence. Thus it would appear that the improvement in movement time with age relates more to a reduction in the time spent on the targets rather than on increase in the speed of the actual movement between the targets: i.e. an improved ability to plan a second movement whilst still performing the first.

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April 13, 1973
9:45 a.m.

OBSERVATIONAL LEARNING OF THROWING BY YOUNG BOYS UNDER CONDITIONS OF ACTUAL AND SYMBOLIC PRESENTATION OF A MODEL. Barbara J. Mead, Ph.D., Purdue University, Major Professor: Marguerite A. Clifton.

This study investigated the effects of incidental and intentional imitation upon young boys' learning of throwing responses under conditions of actual (live) and symbolic (videotape) presentation of a model. The imitation factor, incidental and intentional, was for the purpose of approximating both the social learning and motor learning settings in order to test the logic of applying information derived from the former to the latter. Three mechanical characteristics of the overarm throw were selected as the dependent variables to be studied: stride, spinal and pelvic rotation, and arm action. Rating scales to assess degree of imitation of the model were developed for each of the three, and judges applied the scales to the filmed performances of the subjects in order to derive imitation scores. Subjects for this experiment, 36 three- and four-year-old boys, were randomly assigned to one of the four treatment groups or to the control group. The model selected for the study was a sixteen-year-old male capable of consistent execution of the stride, rotation, and arm movements. Subjects in the experimental conditions were exposed to the model in each of two bouts; each bout consisted of six throws by the model followed by the subject performing six throws in the absence of the model. In the incidental condition the subject was led to perceive the model as another subject, while in the intentional condition he was told to watch and to copy the model. Control subjects had no exposure to the model, but were tested in the same manner as the experimental subjects. Multivariate analyses of variance were employed in order to consider the three dependent variables simultaneously in deriving conclusions regarding differences among groups in degree of learning. Both the imitation and media factors were significant, with the incidental groups scoring higher than either the intentional or control groups, and the TV groups scoring higher than the live or control groups. Within the limitations of this study, it was concluded that: the degree of learning of throwing responses is a function of the type of imitative setting and the mode of presentation of the model, but not of the number of bouts. The superiority of the incidental imitation condition suggests that physical educators can look to the research on observational learning done by social psychologists for guidance in structuring the teaching-learning environment and for a basis in continuing the inquiry as it applies to the development of efficient movement behavior.

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April 13, 1973
10:00 a.m.

PERSONALITY AND GRIP STRENGTH RELATIONSHIPS BETWEEN MONOZYGOUS AND DIZYGOUS TWINS. A. Craig Fisher, Ithaca College: Richard E. Stafford, State University of New York at Oneonta: Charles J. Ansorge, University of Nebraska.

The purposes of the study were twofold: to investigate the relationship between grip strength and the measures of age, height, weight, and the personality traits revealed by the Comrey Personality and Attitude Factor Scales: and to assess the influence of heredity on height, weight, and grip strength. Fifty-eight pairs of twins (MZ=30, DZ=28) served as Ss. Pearson product-moment correlations between grip strength and the factors of age, height, and weight revealed that weight appeared to be the best predictor of grip strength. When age was partialed out by standard score transformation, weight was no longer the best predictor. It was concluded that age was the best predictor of strength for both males and females. The hypothesis that personality might be related to performance in a grip strength testing situation received very little support. Personality did not appear to be an important function of the grip strength score. Within-twin pair variance of the DZ twins consistently exceeded that of the MZ twins on the factors of height, weight, and grip strength. Significant heritability coefficients were found for the factors of height, weight, and grip strength although not all coefficients reached statistical significance for both sexes.

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April 13, 1973
10:15 a.m.

DURATION AND FREQUENCY OF TRAINING AS DETERMINANTS OF CORONARY TREE CAPACITY IN THE RAT. Robert W. Haslam, University of Maryland; G. Alan Stull, University of Kentucky.

This study investigated the effects of selected frequencies and durations of training of young, male, albino rats on (1) the capacity of the coronary arterial tree and (2) the coronary cast weight to body weight ratio. Seventy Wistar rats were randomly assigned to a control and four experimental groups. The control group remained sedentary for eight weeks, and each of the experimental groups engaged in one of the possible combinations of training two or four times weekly over either four or eight weeks. Training consisted of swimming a number of one-minute trials with a thirty-second rest interval interposed between successive trails. Intensity of training was progressively raised by each week increasing the number of repetitions by four bouts. Rats were weighed weekly, and these body weights were used to calculate the resistance which each subject carried while swimming. The resistance represented 5 percent of body weight for animals swimming during the initial four weeks and 4 percent for those swimming during the terminal four weeks of the study. Following the eight-week experimental period, all animals were weighed and their coronary arteries injected with vinyl-acetate. This chemical hardened forming a rigid cast of the coronary arteries. The casts were subsequently weighed on a Metlar electrobalance scale, and these weights were used as measures of the volumetric capacity of the coronary arterial tree. The cast weight to body weight ratio was generated by dividing the coronary cast weight by the body weight of the rat. A two-factor (frequency x duration) analysis of variance in comparison with a control group design was utilized in the data analysis. It was found that when the combined effects of the experimental groups were compared with the values for the control group, both the coronary cast weights and cast weight to body weight ratios were higher for the experimental groups ($p < .05$). No additional significant effects were located.

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April 13, 1973
9:00 a.m.

ADAPTATION OF SELECTED CARDIO-RESPIRATORY PARAMETERS MONITORED CONTINUOUSLY THROUGHOUT AN EIGHT WEEK TREADMILL TRAINING PROGRAM.

Arend Bonen, Gregory C. Gass, Vivian H. Heyward, Department of Physical Education, Physical Fitness Research Laboratory, University of Illinois at Urbana-Champaign, Champaign, Illinois

A number of investigators have reported the effects of training on oxygen uptake and other cardio-respiratory parameters based on pre- and post-training observations. Another picture of adaptation can be obtained, however, by monitoring the parameters of interest on a continual basis throughout training. The purpose of this investigation was to examine, in three well conditioned young men, the changes in submaximal cardio-respiratory parameters during an 8 week training period of treadmill running. Training sessions were conducted on alternate days, three days per week. Each session consisted of a 5 minute warm-up walk at 3.7 mph, followed by a 30 minute run at 6.3 mph ($\simeq$65% $\dot{V}O_2$ max) and a 5 minute recovery walk at 3.7 mph. The treadmill was maintained at zero % grade. Throughout the 40 minute exercise period $\dot{V}_E$ and breathing rate were continuously recorded. Expired air was sampled over each 5 minute period and heart rate was recorded during the last 15 seconds of each 5 minute period. Throughout the training period, the oxygen cost (L/min) and the respiratory rate remained unchanged. It was observed that the $\dot{V}_E$, heart rate and RQ decreased progressively for a given 5 minute period of the run throughout the 8 weeks of training. The same parameters were decreased throughout the 30 minute run when the first week of training was compared to subsequent weeks. These patterns indicated that cardiac adaptation to exercise was progressively enhanced and there was a small shift toward fat metabolism. Comparisons of maximum $\dot{V}O_2$, $\dot{V}_E$ and heart rate before and after training revealed that the maximum $\dot{V}O_2$ was increased but no changes were observed in the maximum $\dot{V}_E$ and heart rate.

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April 13, 1973
9:15 a.m.

RETENTION OF VOLITIONAL CONTROL OF HEART RATE DURING EXERCISE STRESS. Victoria A. LeFevers, University of Iowa; Linda C. Zerkle, Eastern Illinois University.

The purpose of this investigation was to study the effects of a six month period of no practice upon voluntary lowering of the heart rate during exercise stress between the three initial groups--13 Ss in Experimental Group I who received instrumental conditioning with visual feedback, 9 Ss in Experimental Group II who received instrumental conditioning with no visual feedback, and 7 Ss in the Control Group who received no conditioning. It was hypothesized that there were no significant differences between retention of the ability to lower heart rate voluntarily during exercise stress upon the treadmill between the three groups. The retention testing was identical to the original testing under exercise stress--one trial at each of four levels of exercise stress (assigned randomly and measured by heart rate)--100-120 bpm, 120-140 bpm, 140-160 bpm, and 160-180 bpm, while performing upon the treadmill. Analysis of variance and Duncan's New Multiple Range Test revealed that 1) there were no significant differences in retention between experimental groups at any of the four levels of stress; 2) there were significant differences in retention between EGI and CG at levels 100-120 bpm, 120-140 bpm, and 140-160 bpm; and 3) there were significant differences in retention between EGII and CG at levels 100-120 bpm, 120-140 bpm, and 140-160 bpm. It was concluded that type of feedback during initial conditioning period had little bearing upon retention of ability to lower the heart rate during exercise stress, but conditioning did facilitate retention of the skill.

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April 13, 1973
9:30 a.m.

CARDIAC ACCELERATION AND DECELERATION RESPONSE TO MANIPULATED TREADMILL EXERCISE. Richard B. Parr, Central Michigan University

The purpose of this study was to measure changes in cardiac acceleration rates to a predetermined training heart rate and cardiac deceleration rates following exercise. Sixteen male college students were used in the study. Training consisted of running on a Young Treadmill with an elevation of 4% and speed sufficient to elicit heart rates of 140 BPM, 160 BPM, or 180 BPM. Each day the speed of the treadmill was started at 3 m.p.h. and progressively increased until the training heart rate was reached. Training involved 10 min./day, 5 days/wk., for 6 weeks. The intensity of work was regulated by a Quinton QI 607 Automatic Heart Rate Control. Group Tr 140 showed minimal improvements in cardiac acceleration rates. Group Tr 160 showed the greatest improvements in cardiac acceleration rate during the second and third weeks of training. Group Tr 180 showed the greatest improvements in cardiac acceleration during the last three weeks of training as well as the greatest overall improvements. Group Tr 140 demonstrated inconsistent cardiac deceleration when compared to other training groups. Group Tr 160 and group Tr 180 showed greatest cardiac deceleration rates with group Tr 180 having the fastest recovery rate of the three training groups.

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April 13, 1973
9:45 a.m.

STRENGTH RECOVERY FOLLOWING RHYTHMIC OR SUSTAINED EXERCISE AS A FUNCTION OF TIME. Jay T. Kearney, Appalachian State University.

The relative rates of strength recovery subsequent to bouts of rhythmic or sustained isometric exercise were investigated. The research involved implementation of methodological adaptations designed to provide a more realistic comparison of the relative rates of strength recovery. The results were consequently used to assist in resolution of the contradictions inherent in earlier studies. The 72 undergraduates who voluntarily served as subjects were tested 7 times within the framework of a repeated measures design. Each testing session involved two bouts of either rhythmic or sustained isometric exercise separated by a rest interval of 5, 10, 20, 40, 80, 160, or 320 seconds. Strength recovery was evaluated by comparing the level of strength expressed at the conclusion of the initial fatigue bouts, final strength, and the initial strength measure of the second exercise bouts. The analysis of variance and related statistics indicated that: (1) significant strength decrements of similar magnitude were produced by both types of activity; (2) the group of subjects who initially performed rhythmic exercise were consistently stronger than those performing sustained exercise; (3) strength at the end of the first exercise bout was significantly lower than final recovery strength; and (4) initial strength and final recovery strength failed to differ significantly. The exponential analysis revealed that the patterns of strength recovery were both described adequately by two-component equations. The magnitude and rate constants of these curves were also reasonably comparable. Although not in complete accord with previously published results it was concluded that on the basis of the present investigation the patterns of strength recovery subsequent to rhythmic and sustained isometric exercise were similar.

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April 13, 1973
10:00 a.m.

INTERACTION OF FREQUENCY AND INTENSITY OF TRAINING ON PHYSICAL WORK CAPACITY. Thaddeus R. Crews, Northern Virginia Community College.

The purpose of this study was to determine the effect, if any, of the interaction of frequency and intensity of training (walking and/or jogging) on the physical work capacity, cardiovascular function and body composition of adult males. Forty-six sedentary male subjects were pretested on the following variables: physical work capacity, exercise and recovery heart rates, oxygen consumption, oxygen debt, respiratory quotient, ventilation equivalent and per cent body fat. Participants were randomly assigned to one of six training groups after an initial blocking on pretest physical work capacity scores. The subjects trained for seven weeks as members of the six groups representing all possible combinations of three levels of frequency of training (five, three or one day per week), and two levels of intensity of training (exercise heart rates of 150 and 120 beats per minute). All participants exercised 50 minutes each week, and thus the duration of a training session for each individual was dependent on the frequency of training. It was not required that the walking and/or jogging be performed continuously, but only that the subject train at the desired intensity level for the appropriate number of minutes. The jogging pace was progressively increased to maintain the desired intensity level as the condition of the subjects improved. Exercise heart rates during the training sessions were estimated by palpation during a 10-second interval immediately following exercise. At the end of the training program, the subjects were posttested in a manner identical to that of the pretest. The results of the statistical analyses revealed no significant interaction effect for any of the dependent variables. Examination of the main effects disclosed significant F ratios for intensity of training for the dependent variables physical work capacity, recovery heart rates at one, three and five minutes following a standard treadmill test and per cent body fat. Inspection of the pretest and posttest means for these variables indicated a greater training effect for the 150 intensity level. The only significant F value for the main effect, frequency of training, was found for physical work capacity. Through the use of a multiple comparison test, it was shown that both the five and three-day-a-week groups had significantly greater improvement than the one-day-a-week group. There was no significant difference between the five and three-day groups.

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April 13, 1973
10:15 a.m.

THE SEQUENCE OF HIP AND SELECTED UPPER-EXTREMITY JOINT MOVEMENTS DURING THE GOLF DRIVE. Charles L. Hunter, State University College, Potsdam

The purpose of the study was to analyze wrist, elbow, and hip actions of golfers while accurately driving a golf ball a maximum distance. Electrogoniometry and cinematography were used to measure wrist, forearm, elbow, and hip actions during the downswings of 10 low-handicap golfers while attempting to drive a minimum of 225 yards within a 50 yard corridor. Elgons were used to measure movements of the elbow (flexion-extension), forearm (pronation-supination), wrist (adduction-abduction, flexion-extension) at selected angles of the arm relative to a vertical line passing through the shoulder. Lateral and horizontal hip movements were recorded with a specially constructed analyzer. Motion pictures (64 frames/second) were taken in order to measure shoulder joint positions. Electrogoniograms were analyzed at selected positions: top of backswing; left arm horizontal, 45° from vertical, 22.5° from vertical, at vertical, and at ball contact. Analysis of mean values for joint positions revealed: (1) Active adduction of both wrists and right-wrist flexion just before ball contact, (2) Constant rate of lateral and rotational hip movement throughout the downswing, (3) The left elbow more fully extended than the right and near full extension at contact, (4) Considerable variation in forearm rotation, (5) Left-wrist flexion-extension positioning which was similar among golfers at ball contact, (6) The long axis of the left arm slightly beyond the vertical position at contact, and (7) No consistency among golfers relative to the position assumed while addressing the ball. It was concluded that there was no common pattern of action among the low-handicapped golfers, but that there were certain common characteristics relative to the timing and sequence of specific actions (e.g., wrist adduction and flexion just before ball contact).

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April 13, 1973
10:30 a.m.

EFFECTS OF RATE OF MOVEMENT ON EFFECTIVE MAXIMAL FORCE GENERATED BY ELBOW EXTENSORS.[1] Wynn F. Updyke, University of Florida; Victor Brenneman, University of Toledo; William Taggart, Northern Michigan University.

Forty male volunteers, aged 18-21, were tested for full range maximal isotonic strength of elbow flexors on a constant speed electrically powered dynamometer. Subjects were placed in the supine position and secured to a plinth with the left arm attached to the dynamometer lever arm, the fulcrum of which was aligned with the axis of elbow rotation. Clockwise and counter-clockwise rotation of the lever arm corresponded to elbow extension and flexion respectively. Subjects were tested in two modes ("concentric" and "eccentric" contraction) at each of three different velocities (.10, .20, and .33 radians/sec.). In the concentric mode subjects attempted to accelerate the lever arm by maximal sustained dynamic contraction of elbow extensors. In the eccentric mode subjects vigorously resisted elbow flexion forced upon them by the powered movement of the dynamometer. (Special electronic servo mechanisms were provided to avoid rate fluctuations due to back EMF.) It was hypothesized that forces observed would have an inverse relationship to speed of muscle shortening (or lengthening). The hypothesis was rejected (ANOVA, $P < .05$). Analysis revealed remarkably similar force curves at all three speeds, in terms of peak forces generated as well as slopes of the curves preceeding and following peak forces. As expected, mean peak forces occurred at approximately the same point in the curves regardless of mode or speed. Eccentric forces generated were consistently higher than concentric forces. It was concluded that subtle adaptations in the musculoskeletal linkages resulted in relatively constant force output regardless of variations in rate of muscle shortening.

1. This study was supported in part by a grant from the Research Council of the Graduate School of the University of Toledo.

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April 13, 1973
10:45 a.m.

FUNCTIONAL PROFILES OF SEVEN-FOOT AND SUB-SEVEN-FOOT HIGH JUMPERS. David A. Kaufmann, University of Florida

The purpose of this study was to determine if there were differences between seven-foot and sub-seven-foot high jumpers in the relative lean body weight, hip joint flexibility, oxygen consumption, upper limb reaction time and response time, lower limb response time, running agility, jumping power, running speed and torque about the hip and knee joints. Two seven-foot high jumpers and two sub-seven-foot high jumpers were measured in the above parameters. It was found in this study that 1) the sub-seven-foot high jumpers were superior in flexibility of the hip joint and upper limb response time 2) both groups of high jumpers were similar in oxygen consumption, upper limb reaction time, forward step and backward step response times, running agility, running speed, torque (straight kicking leg) in flexion about the hip joint and torque (kicking leg) in extension about the knee joint and 3) the seven-foot high jumpers were superior in relative amount of lean body weight, jumping power, torque (bent kicking leg) in flexion about the hip joint, torque (bent jumping leg) in extension about the hip joint and torque (jumping leg) in extension about the knee joint.

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April 13, 1973
11:00 a.m.

A CINEMATOGRAPHIC ANALYSIS OF CHARACTERISTIC LIKENESSES AND DIFFERENCES BETWEEN SKILLED, SEMI-SKILLED, AND NON-SKILLED PERFORMANCE OF PIROUETTES. MargeAnn Hume McMillan, Texas Woman's University.

A cinematographic analysis was conducted on performances of pirouettes en dehors by 9 women representing 3 different skill levels. A 16 mm. Bell and Howell HR 70 camera with a lens setting of f:1.6 was used in the filming. Tracings of 19 frames of film depicting the sagittal and frontal views of each subject were analyzed with respect to the preparation, turn, and conclusion of the pirouette. Point-and-line drawings of the movements of the ankle of the supporting leg and the ear or nose were constructed from the same selected frames of both views of the pirouette and used to analyze the movement of the supporting leg and to determine the periods of greatest utilization of floor space. The investigator concluded that cinematography can be used to identify similarities and differences between skill levels, to determine the extent to which skill performances adhere to characteristics of "good form" as stated in the literature and by experts, and to provide new information which will contribute to a more complete understanding of the movement patterns used in the execution of a skill.

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April 13, 1973
11:15 a.m.

THE EFFECTS OF STARTING BLOCK LENGTH, ANGLE, AND POSITION UPON SPRINT PERFORMANCE. Harold H. Morris, Northern Illinois University

This investigation considered the effects of variations in starting block position, front starting block length, and front starting block angle upon movement times from the starting position and upon running time. The three starting block variables, starting block position at four levels, front starting block length at two levels, and front starting block angle at three levels were arranged in a 4 x 2 x 3 factoral with repeated measures on one variable. Forty randomly selected male undergraduate students were randomly assigned to one of eight treatment groups. Each group practiced and was timed from a treatment condition that specified a single starting block position and a single front starting block length. All subjects, however, practiced and were timed from each of the three front starting block angles. Initial movement time of the hands, starting time of each foot, and running time across each of four equal segments of the 50-yard dash were recorded and analyzed as the criterion measures. Each criterion measure was subjected to an analysis of variance. Sprint performance was not affected by variations in starting block position. Initial movement time and starting time of the rear foot were affected by the angle of the front starting block. Front starting block angles and front starting block lengths interacted to cause differentiating effects upon the starting time of the front foot and upon acceleration during the initial segments of the dash. The advantage gained during acceleration due to the favorable effects of specific starting block conditions was present at the end of the dash. Initial movement time and the starting times of the feet are inadequate as measures of the effects of starting variables upon sprint performance. Runners accelerate to a point between 25 and 37 1/2 yards from the starting line.

Harold H. Morris
Department of Physical Education
Northern Illinois University
DeKalb, Illinois

April 13, 1973
11:30 a.m.

THE RELATIONSHIPS AMONG LEG STRENGTH, LEG POWER AND ALPINE SKIING SUCCESS. Larry R. Gettman, Ph.D., University of Denver; Jack R. Huckel, University of Denver.

The purpose of this study was to relate leg strength and power to alpine skiing success as measured by FIS points. Isometric leg strength was represented by the knee extension test described by Clarke. Leg power was measured by the vertical jump test and the Margaria-Kalamen stair run. Results in the strength and power tests were correlated with the FIS points in three different alpine events (downhill, slalom, and giant slalom). Subjects consisted of 26 female and 28 male participants in a national junior alpine development camp during June, 1972. These individuals were the best junior alpine ski racers in the U.S. for the 1971-72 season. The total number of both male and female skiers having FIS points in the downhill, slalom, and giant slalom events was 24, 40, and 42, respectively. Considering the entire group, a significant correlation coefficient was observed between FIS points in the giant slalom event and total leg strength. For females, significant correlations were found between success in the giant slalom and leg strength, stair power, and vertical jump work. For males, significant relationships were seen between vertical jump work and FIS points in the downhill and giant slalom events. In conclusion, for female junior alpine skiers, leg strength and power measurements were only related to success in the giant slalom event. For male junior skiers, only the leg power measurement of vertical jump work was related to the downhill and giant slalom events.

Larry R. Gettman, Ph.D.
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April 13, 1973
11:45 a.m.

A STUDY OF FACTORS RELATED TO SPEED OF RUNNING AND REACTION TIME AMONG BLACK, MEXICAN-AMERICAN, AND WHITE FEMALES ELEVEN YEARS OF AGE IN THE PERFORMANCE OF THE 50-YARD DASH. Mary A. Ramirez, Texas Woman's University.

A comparative study was conducted to measure reaction time and speed of running between various segments of the 50-yd. dash; specifically, 15 yd., 30 yd., 50 yd., starting time, acceleration speed, and maximum sprint velocity. Subjects selected for the study were 100 black, 55 Mexican-American, and 45 white. Data were collected by electric eye rods, electric timers, and a modified starting pad. Data were subjected to statistical treatment of ANOVA. No significant differences in wt., ht., and reaction time among the black, Mexican-American, and white groups were noted. Significant differences ($p < .01$) were obtained between the groups in favor of the black children on speed of running 15 yds., speed at 30 yds., and speed at 50 yds. Similar significant differences were noted in comparisons of time derived from various segments of the race: starting time. 15 yds. minus reaction time; acceleration time, 30 yds. minus 15 yds.; and maximum sprint velocity, 50 yds. minus 30 yds. All differences among these items were found to be highly significant at the .01 level in favor of the black subjects with the exception of maximum sprint velocity, which was significant at the .05 level. No significant differences were discovered between the white and Mexican-American children. The investigator concluded that black children have significantly faster times in running the 50-yd. dash and faster comparable segments than white or Mexican-American children of similar age, grade level, wt., and ht. Since no significant differences were found between the groups in reaction time, it would seem that speed as measured in this study does not appear to be closely related to reaction time.

Mary Angela Ramirez
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April 13, 1973

3:15 p.m.

The Relationship Of Attitudes And Locus Of Control To Physical Fitness And To Frequency Of Exercise. Robert J. Sonstroem and Maxwell I. Walker, University of Rhode Island.

The purpose of this research was to examine the relationship of locus of control to maintenance of physical fitness. Attitudes regarding the instrumentality of physical activity were employed to specify direction for the locus of control construct. A random sample of 102 college upper-classmen was obtained from the middle quartiles of a distribution of 600-yard run scores recorded when subjects were freshmen. Subjects were recruited with a letter signed by the Director of University Health Services inviting them to participate in a study assessing student living habits. Subjects were paid $5 and represented 83.1% of those people receiving the letter. At the University Health Center a physical examination, Kenyon's ATPA test, Rotter's I-E Scale, and a study-developed inventory assessing voluntary participation in physical exercise were administered to subjects. On a subsequent day they again performed the 600-yard run. Four groups of subjects were formed by dichotomizing attitude and control scores. Internal controllers with positive attitudes regarding physical activity performed significantly better (.01 level) at the 600-yard run than the other three groups as tested by analysis of covariance and planned comparisons. They reported significantly greater involvement (.01 level) in recreational physical activity as tested by analysis of variance and planned comparisons. A further analysis of the data indicated that within three of the attitude score quartiles, internal controllers performed more favorably on dependent variables than did external controllers. First quartile results were interpreted as supporting previous locus of control research which concludes that externals devalue the reinforcement value of a task after failing to achieve at that task, while internals are more prone to take action for personal improvement.

Robert J. Sonstroem
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April 13, 1973
3:30 p.m.

MUSCULAR STRENGTH, SOCIAL ADJUSTMENT, AND PERSONALITY TRAITS IN FIVE SOCIO-ECONOMIC GROUPS. Charles W. Jackson, Old Dominion University.

The purpose of this study was to investigate the differences in strength, social adjustment, and personality traits of boys in the various socio-economic brackets at the junior and senior high school levels. The Two Factor Index of Social Position was obtained for each boy in grades seven, nine and eleven of selected schools in Norfolk and Virginia Beach, Virginia. From this population, a sample of approximately 100 boys for each of the five socio-economic groups was selected by the use of a table of random numbers. Data relative to muscular strength (Strength Quotient using Cable-tension strength tests), personality (Junior-Senior High School Personality Questionnaire), and social adjustment (Cowell Personal Distance Ballot) was collected by the investigator. The data collected were treated statistically by using the treatments x levels analysis of variance technique. The results of the various analyses revealed the following findings: 1. 7th and 9th grade upper socio-economic groups scored significantly higher on the Strength Index than any of the other boys studied. Also, when age and weight were considered in computing the Strength Quotient, the 11th grade boys did not score as high as the 7th and 9th grade boys. In addition, all of the mean Strength Index scores obtained were well below the established medians for the respective groups. It appears that if boys in the low socio-economic bracket valued strength, they did not reflect these values on performance tests of strength. 2. The comparison of the social adjustment scores of the boys indicated that there were no significant differences between the socio-economic groups. 3. The comparisons of the 14 HSPQ personality scores of the boys indicated that only a few of the qualities measured reflected significant differences between the various groupings established.

Charles W. Jackson
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April 13, 1973
3:45 p.m.

SOCIAL FACILITATION EFFECTS ON CHILDREN DURING EARLY STAGES OF MOTOR LEARNING. James M. Crabbe, The University of Iowa.

Zajonc has implied that drive, as evidenced in social facilitation research, is innate. In contrast, Cottrell has hypothesized that this drive is a result of social learning. Zajonc implied that the trend of early learning scores on a difficult task would be lower for a subject who learned in the presence of an Audience than for a subject who learned Alone. Cottrell has implied that a young person, not socially conditioned to anticipate positive and negative outcomes from an Audience, would perform similarly in the presence of an Audience or Alone. The purpose of this study was to investigate the Zajonc-Cottrell theoretical conflict pertaining to drive by testing children during early learning on a gross motor task, and within the Audience effect paradigm of social facilitation. Two hundred and forty youngsters served as subjects. They were selected randomly of both sexes and equally from a large preschool and a public school second-grade. Each subject completed 10 trials on the stabilometer task under an "Alone" or an "Audience" learning condition. Average and trend learning scores were computed for each subject. Three multi-dimensional analysis of variance designs were used in the analysis. The .05 level of significance was chosen to designate the region of rejection of the null hypothesis. Second-grade subjects attained a higher level of performance than did preschool subjects. The analysis for rate of learning revealed an interaction between Audience conditions and Age levels. Preschool subjects learned in the Alone condition at a higher rate than when in the presence of an Audience. However, second-grade subjects learned at a higher rate in the presence of an Audience than in the Alone condition. Within the limitations of this study, it was concluded that the motor response tendencies of children are most probably influenced by their prior social experiences. This conclusion tended to support the Cottrell hypothesis that performance, in the audience effect paradigm of social facilitation, is dependent upon the child's social history.

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April 13, 1973
4:00 p.m.

PSYCHOLOGICAL EFFECTS OF DISTANCE TRAINING ON EIGHT TO TWELVE YEAR OLD CHILDREN. Kenneth G. Burnsed, University of Florida.

Serving as subjects in the study were 45 volunteers from a previous summer's age group track program and 29 students in a fifth grade class at a local elementary school. The subjects were divided into three groups for observation. Group I (N=17) underwent an eight-week distance training program. Group II (N=28) served as a training control group, undergoing an eight-week program during which the basic fundamentals and techniques involved in the various field and sprinting events of track and field were taught. Groups I and II met at different times for one hour sessions, five days a week. Group III served as a pure control group and consisted of students in the fifth grade class at a local elementary school. R. B. Cattell's fourteen factor Children's Personality Questionnaire, Form A, was administered to all three groups immediately prior to and following the eight-week program. An analysis of covariance with the pre test serving as the covariant was performed on each of the fourteen factors of the Children's Personality Questionnaire with the aid of an IBM Series 365-60 computer at the University of Florida. The variables considered in the analysis of covariance were sex, group, and sex by group interaction. Groups I and II scored significantly higher (α =.05) than Group III on Factor B, less intelligent vs. more intelligent, following completion of the program. Also, females scored significantly higher (α =.05) than males on Factor D, phlegmatic vs. excitable. No other statistically significant differences were obtained.

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April 13, 1973
4:15 p.m.

EFFECTS OF CONTINUOUS AND INTERMITTENT WORK ON HEAT ACCLIMATION OF WOMEN. Judith T. Fein, Department of Physical Education for Women, University of Iowa, Iowa City, Iowa 52240*

The purpose of this study was to determine the effects of continuous and intermittent work on acclimating young women to a hot dry environment. Nine physically active young, equated on the basis of maximal oxygen uptake per kilogram of body weight, performed either continuous or intermittent work on a treadmill for 100 minutes daily for eight days under conditions of 49/46±1°C db/wb. The continuous group walked on a level treadmill at a rate which resulted in a work load which was equal to 34±4% of their maximal oxygen uptake. The intermittent group worked and rested for five minute intervals. Walking speed was 3.5 mph and the treadmill was elevated to a grade which resulted in an average oxygen consumption of 34±4% of maximal. Physiological measurements included: mean skin temperatures, rectal temperatures, heart rates, sweat rates, and energy metabolism. Graphic and subjective techniques were employed to analyze the data. Criteria used for the development of acclimation were lowered work rectal temperatures, mean skin temperatures and heart rates; increased sweat production; ability to complete assigned tasks and subjective comfort. Individuals in the intermittent group became acclimated to the heat, while in the continuous group, two subjects became acclimated and two partially acclimated.

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April 13, 1973
4:30 p.m.

ASSESSMENT OF THE AEROBIC CAPACITY OF YOUNG ACTIVE FEMALE AMERICAN PHYSICAL EDUCATION MAJORS. L. Dennis Humphrey and Harold B. Falls, Southwest Missouri State University.

The purpose of the study was to determine the maximum aerobic capacity of a large group of young active American female physical education majors. Fifteen subjects utilized a progressive bicycle ergometer test, and 36 subjects utilized a motor driven treadmill to complete the Balke Progressive Test. Heart rates were recorded each minute by utilizing a bipolar EKG connected to a physiograph recorder. Expired air was collected in Douglas bags, and the final two minutes of the progressive exercise were analyzed for concentrations of CO_2 and O_2 by utilizing a Godart analyzer calibrated against a micro-Scholander and a Gallenkamp-Lloyd apparatus. Gas volumes were determined by evacuating the air through a dry gas meter. Each subject was tested twice and the results averaged. Means for both groups were as follows:

Means	Bicycle	Treadmill
$\dot{V}O_2$ liters/min. STPD	1.97	2.23
$\dot{V}O_2$ ml/min./kg STPD	34.35	39.80
$\dot{V}O_2$ liter/min. BTPS	78.26	90.53
Max. Heart Rate	184.6	191.7
Exercise Duration	14.7	16.6
R.Q.		1.03

For the treadmill group the determined $\dot{V}O_2$ was nearly identical to the value reported for female physical education majors in 1942, similar to basketball players in Massachusetts, and greater than values reported for nonathletes and nonphysical education majors in this country. However, when compared to female Swedish physical education students, Norwegian athletes, Czechoslovakian swimmers, and American speed skaters, the treadmill group's $\dot{V}O_2$ was considerably less. For the bicycle group the determined $\dot{V}O_2$ was approximately 13% less than the treadmill group, considerably greater than values reported for California nonathletes, similar to other nonathletes and basketball participants in New York. However, the bicycle group was less than the values reported for other physical education students and considerably less than the values reported for Swedish, Norwegian, Czechoslovakian, and American athletes.

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April 13, 1973
4:45 p.m.

THE EFFECT OF SPECIFIC EXERCISES ON SUBCUTANEOUS FAT AND SEGMENTAL VOLUME OF THE ABDOMINAL REGION IN COLLEGE WOMEN.

Mignon Jutton, University of Missouri-St. Louis and James H. Johnson, Washington University, St. Louis, Missouri.

The purpose of the study was to compare the effectiveness of a system of specific abdominal exercises with generalized exercise on the reduction of segmental volume and subcutaneous fat of the abdominal region in college women. The study was conducted during the first six weeks of the 1972 Spring semester, with volunteer female subjects enrolled in Gymnastics, Volleyball, Swimming and Ice Skating at Washington University, St. Louis, Missouri. Subjects were tested initially for subcutaneous fat taking three skinfold measures at the abdominal region. Subjects were divided at random into control and experimental groups and both groups participated in an activity class for six weeks. In addition, the experimental group performed a set of specific abdominal exercises three times weekly for the six weeks. The exercises were basket hang, hook lying sit-up, side-lying trunk raise, and controlled backward lean. Subjects gaining or losing three percent or more body weight were eliminated from the study. The remaining twenty-six subjects were tested following the training period and the mean change between initial and final measurements was analyzed for both groups on each of the variables, using a t-test for correlated means. An analysis of corvariance was used to determine any significant differences between the groups on each post-test. Pearson's product moment method was employed to determine the relationship between skinfold measures and abdominal volume. Specific abdominal exercise is significantly more effective in reducing segmental abdominal volume than generalized exercise when body weight remains unchanged in college women during a six week, 3 days/week, exercise program. Adipose tissue in the abdominal region, however, is not significantly reduced by either specific or generalized exercise when body weight remains unchanged in college women. There is a low positive relationship between abdominal volume and adipose tissue (r=0.336).

Mignon Jutton
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April 13, 1973
5:00 p.m.

A COMPARISON OF WEIGHT REDUCTION METHODS THAT USE DIET AND EXERCISE. W. B. Zuti, Kansas State University; Lawrence A. Golding, Kent State University.

The purpose of this study was to compare the amount of weight loss that occurred with the use of three different methods of weight reduction. The 25 adult women used as subjects in this study were between 25-45 years of age and approximately 20-40 lbs. overweight. This study was designed to create a caloric deficit that would cause a reduction in body weight of 1-lb/week for 16 weeks, for all groups. The three experimental groups used diet, exercise and a combination of diet and exercise as the means of weight reduction. The group using the all diet method consisted of eight subjects who reduced their caloric intake by 500 Cal/day and held their physical activity constant. The all exercise group of nine women increased their physical activity by 500 Cal/day and maintained their caloric intake at a constant level. The eight women in the combination group reduced their intake by 250 Cal/day and increased their physical activity by 250 Cal/day. The subjects were weighed in the post absorbative state before and after the 16-week experimental period to determine changes in total body weight. During the experimental treatment the subjects were controlled in their daily caloric intake and in their daily physical activity. A two-way ANOVA repeated on one measure was used to analyze the data. The results indicated the methods used to create a 500 Cal/day deficit were only partially effective, since only 71.1% of the projected 16 lbs. weight loss was attained. The results of the two-way ANOVA indicated the method used to create a caloric deficit had no significant effect on the amount of weight lost. The average loss of the diet group was 11.7 lbs., for the combination group it was 12.0 lbs. and for the all exercise group it was 10.6 lbs. The method of determining caloric expenditure may have created some error when estimating the amount of weight the subjects would lose. The data indicated that since there was no statistical difference in weight loss among the groups, that the method in which a caloric deficit is created is not important.

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April 13, 1973
5:15 p.m.

MAXIMAL OXYGEN INTAKE AND MAXIMAL WORK PERFORMANCE OF ACTIVE COLLEGE WOMEN. Susanne L. Higgs, University of Saskatchewan, Regina Campus.

The purpose of this study was to measure an individual's capacity to work for a period of time at the intensity of exercise which had elicited her maximal oxygen intake. A sub-problem of the study was to investigate the relationship between maximal oxygen intake and work time at the level of work which elicited maximal oxygen intake. Twenty women physical education majors served as subjects. The treadmill technique described by Taylor et al., which consisted of a varying number of discreet runs, was essentially utilized for the assessment of maximal oxygen intake. Following the measurement of maximal oxygen intake, each subject underwent an all-out endurance performance test on the treadmill at the work level which had elicited her maximal oxygen intake. The findings were as follows. Mean maximal oxygen intake was 41.32 ml./kg./min. and mean maximal heart rate was 185.8 bts./min. In the endurance performance test the mean run time for all subjects was 4:35.8 minutes. Correlation between maximal oxygen intake and performance time was calculated and found to be insignificant ($r = .066$); however, a highly signficant correlation was obtained between maximal oxygen intake and physical work done during the performance test ($r = .64$).

Susanne L. Higgs
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April 13, 1973
5:30 p.m.

EFFECTS OF ENDURANCE JOGGING PROGRAM ON
CARDIOVASCULAR SYSTEM AND BODY COMPOSITION
IN MIDDLE AGED-WOMEN

Ali Tooshi
Jersey City State College

Purpose: The purpose of this study is to investigate the effects of 30 mins endurance jogging on pulse rates at rest, during exercise and at recovery and eight skinfold fat measures in middle-aged women.

Method: The subjects in this study were 15 middle-aged women between 30 and 58 years of age who have not been engaged in any exercise program at least for one year. Eight sedentary subjects were used as control group. The program was continues progressive jogging. The intensity of work out was set at 14 mins per mile at the beginning of the program and it was increased to 8 mins at end of tenth week of the program.

The subjects exercised 30 minutes a day, five days a week for total of 16 weeks.

A six minutes submaximal exercise test was administrated to all subjects using Monarch bicycle ergometer. The procedures followed in administration of test was similar to Astrand. The pulse rates recording were made on the Exercise Cardio Tachometer. The fasting body weight and eight skinfold fat measures were obtained from all the subjects, using Lange Skinfold fat Caliper.

For the treatment of the data, t test was employed and five per cent level of significant was accepted.

Results:

1. A significant reduction was occured in resting, exercise and recovery pulse rates.
2. A significant reduction was made in skinfold fat measures
3. No significant reduction was noticed in body weight.

Ali Tooshi
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April 13, 1973
5:45 p.m.

THE THROWING PATTERNS OF THE MENTALLY RETARDED. DAVID AUXTER, SLIPPERY ROCK STATE COLLEGE.

The purpose of this study was to explore the developmental sequences which lead to the acquisition of throwing skills among the Mentally Retarded. The subjects in this study were 110 educable mentally retarded children between the ages of 7 and 12 years with an I.Q. from 50 to 75. A spring operated movie camera set at 64 frames per/sec was used to collect data for the purposes of studying developmental throwing patterns in the mentally retarded. The developmental patterns were assessed in accord with the spatial temporal integration of the body parts in the throw as compared to conceptual models of appropriately integrated throwing patterns. The analysis of the data was concerned in observing the following elements of the throw 1) amount of body rotation, 2) length of the step forward, 3) temporal transfer of weight in relationship to the release, 4) integration of the joint actions required to throw the projectile, 5) the angle of the release of the projectile, 6) spatial temporal integration of the component parts of the throw. The 110 throwing behaviors were classified into 16 distinct patterns which indicated progression in spatial-temporal integration of more body parts. Thus a developmental scale was constructed of patterns of throwing progression. Such a scale enables the measurement and subsequent prescription of activities for the purpose of engaging children in progressively more elaborate throwing patterns and integrated neuromuscular movements for throwing purposes.

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April 13, 1973
4:30 p.m.

THE RELATIONSHIP BETWEEN PHYSICAL FITNESS AND INTELLIGENCE IN TRAINABLE MENTAL RETARDATES. James E. Liese, J. F. Kennedy School Harold A. Lerch, University of Florida.

The purpose of this study was to determine if any relationship exists between intelligence and physical fitness in high school age trainable mentally retarded males. Each subject was administered the Stanford Binet Intelligence Test (Form L-M), the A.A.H.P.E.R. Youth Fitness Test and the Fleishman Basic Fitness Tests. A correlation matrix was devised and the coefficients were checked for significance. The findings tend to support the notion that fitness and intelligence are significantly related.

James E. Liese, Ph.D.
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April 13, 1973
4:45 p.m.

THE EFFECT OF TWO LEVELS OF PRE-TASK EXERCISE UPON THE PERFORMANCE OF A GROSS MOTOR TASK BY EDUCABLE MENTALLY RETARDED CHILDREN. Jan C. Stoner, The University of Texas at Austin.

Specifically, the exercise bout consisted of riding a bicycle ergometer at one-half maximum effort (Group 1) and at one-fourth maximum effort (Group 2) for two minutes at a rate of one revolution per second. Immediately following the exercise bout each subject performed ten trials of twenty seconds duration on the stabilometer with twenty second intertrial rest periods. The control group (Group 3) had the same learning task but was not involved in a pre-task exercise bout. Ninety subjects, between the ages of twelve and eighteen years, were randomly assigned to one of the three groups. On the second day of testing (Day 2) all subjects returned to the test room in a non-exercised condition. Each performed five stabilometer trials of twenty seconds duration with a twenty-second intertrial rest period. Analysis of the scores obtained from the first day revealed non-significant differences between groups. Analysis of the second day's scores also revealed non-significant differences among the groups. The performance scores for trials one through fifteen, however, showed a significant difference for all groups. These scores showed a linear learning curve with significant improvement between the initial and final performance trial. Based on this evidence it was concluded that the exercising activities on the first day of trials did not significantly effect learning.

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April 13, 1973
5:00 p.m.

RELIABILITY ESTIMATES OF GRIP STRENGTH ASSESSMENT IN THE INSTITUTIONALIZED MENTALLY RETARDED. Colleen George, North Texas State University.

Forty-eight right-handed students at the Denton State School were given grip strength tests with a Jamar dynamometer to determine the effect of the tonic neck posture upon preferred and nonpreferred grip. Three different reliability estimates illustrated the fallacy of using the simple product moment r as the measure of reliability. The institutionalized mentally retarded subjects in the study exhibited a wide range of ability as well as significant trial-to-trial variation in strength measures. The data were appropriate for application of an alternate reliability estimate as well as rationale for choice of a criterion measure as expressed in recent research reports of isometric strength. Possible reasons for variability in the institutionalized retarded subjects' strength scores were discussed. Suggestions were made for an alternate measurement schedule designated to reduce error variability in the institutionalized mentally retarded subjects in the study.

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April 13, 1973
5:15 p.m.

STABILOMETER PERFORMANCE AS A FUNCTION OF LEG STRENGTH BY MENTALLY RETARDED AND NONRETARDED ADOLESCENT MALES. William C. Chasey, Peabody College.

The purpose of this study was to investigate the relationship between leg strength and stabilometer performance by 15 institutionalized trainable mentally retarded (TMR), 15 institutionalized educable mentally retarded (EMR), 15 noninstitutionalized EMR, and 15 nonretarded adolescent males. Each S was measured for leg strength, leg girth and calf girth prior to performance on a standing broad jump and stabilometer tests. The mean of three trials on the standing broad jump test and the mean of 10 trials on the stabilometer, each trial of 30 seconds duration with a 15 second rest period between trials, were used for analysis. It was hypothesized that: (a) nonretarded Ss would perform better than retarded Ss; (b) EMR Ss would perform better than TMR Ss; (c) noninstitutionalized EMR Ss would perform better than institutionalized EMR Ss; (d) leg strength would be related to stabilometer performance for all groups on both tasks, and leg length, thigh girth and calf girth would be related to performance on the standing broad jump and stabilometer for all groups. Analysis indicated that hypotheses 1, 2 and 3 were tenable. There was a progressive significant difference in stabilometer performance and intelligence levels. EMR Ss performed significantly better than TMR Ss. Noninstitutionalized EMR Ss performed better than institutionalized Ss. Stabilometer and broad jump performances correlated for all groups except the TMR Ss (.05). There was no significant difference between the three anthropometric measures and performances on the two motor tasks.

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April 13, 1973
5:30 p.m.

DISTRIBUTION OF PRACTICE AS A FACTOR IN MENTAL RETARDATES ACQUISITON OF A MOTOR SKILL. Stanley L. Bassin and Michael Webster, California State Polytechnic University, Pomona.

The purpose of this study was to determine which type of practice schedule would enhance mental retardates motor performance and learning. Thirty male mentally retardate subjects were matched as closely as possible according to I.Q., C.A., and M.A. Their scores ranged from 36 to 67 mean 52, 6.0 to 14.0 mean 9.0, 13 to 22 mean 18.0, respectively. The instrument used to measure learning was a modified Lafayette Pursuit Rotor with a 3/4 inch round target which rotated in a circle with a 10 inch diameter. The target rotated clockwise at 33 rpm. Each subject performed 20 pre-rest trials on either a schedule of 20 seconds work and no rest, or 20 seconds work and 20 seconds rest. After a 5 minute interpolated rest, all subjects performed for 7 additional trials on a 20 second work/10 second rest schedule. The results indicated that the distributed group performance was significantly better than the mass group, when initial trial and final pre-rest trial scores were calculated. There was no significant difference found in learning between the 2 groups when initial pre-rest trial and first post-rest trial scores were compared. The mass practice group demonstrated a significantly different reminiscence score from the distributed practice group, between the final pre-rest trial and inital post-rest trial. The adjacent trial reliabilities ranged from .68 to .88 for the mass practice group, and .87 to .94 for the distributed practice group. In view of the results, it appears that mental retardates follow similar learning and performance profiles, as normal subjects, reported in the literature.

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April 13, 1973
5:45 p.m.

PATTERNS OF ERROR IN KINESTHETIC PERCEPTION*. Waneen Wyrick, The University of Texas at Austin.

Individuals' kinesthetic perception was investigated to detect patterns of subjective reduction, augmentation, or moderation of stimuli. Absolute errors and variable errors were determined for 34 college men on three tests of kinesthesis: joint angle reproduction (JAR), muscular tension reproduction (MTR), and limb load discrimination (LD). Measurements were obtained by electrogoniometry, electromyography, and the Difference Limen technique. Data were normally distributed and the constant error neared zero; consequently absolute and variable errors were highly correlated (.86). Under these conditions variable error and constant error were measuring the same thing, therefore only variable error was used in consequent analyses. Variable errors in kinesthetic perception among the three tests were not significantly correlated, with r coefficients ranging from .03-.19. A multiple discriminant analysis revealed that when the subjects were post-data collection categorized into augmenters, reducers, or moderators of the basis of JAR, they were not also differentiated as such in the other two tests of kinesthetic perception. One significant univariate F ratio supported the hypothesis that moderators in weight discrimination also tended to be moderators of JAR. When the proprioceptive tests were considered multivariately, however, no pattern emerged. On the basis of these results, Petrie's model of augmentation and reduction of stimuli must be questioned and perhaps supplanted by a model of proprioceptive specificity.

*This investigation was supported by PHS Research Grant NS09854-01 from National Institute of Neurological Diseases and Blindness.

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April 14, 1973
9:00 a.m.

THE EFFECT OF STIMULUS CONDITION AND DIRECTION ON THE REACTION TIME AND MOVEMENT TIME OF SELECTED ATHLETIC GROUPS. Thomas R. Burke, Hunter College

This study was conducted to investigate the effects of stimulus condition and direction on the reaction time (RT) and the movement time (MT) of closed and open skill athletes. The stimulus conditions were simple and complex. In the simple stimulus condition, the athlete knew in advance of response initiation the direction of movement but did not know when to initiate the response until stimulus activation. Under the complex stimulus condition, the athlete did not know in advance of response initiation either when or what directional response to initiate until stimulus activation. The directions of movement were to the front, to the right, to the left and to the rear of the athlete. The closed skill athletes (CSAs) were cross-country runners, swimmers and gymnasts; and the open skill athletes (OSAs) were basketball, baseball and soccer players. Each athlete performed a total body movement in each of the four directions under simple and complex stimulus conditions. Measures of RT and MT were recorded for each athlete. An analysis of variance was used to analyze the RT and MT measures. Significant differences in RT measures were observed between: 1) the simple and complex stimulus conditions, 2) the open and closed skill athletes, and 3) the four directions with the RT measures to the back the slowest, faster in the right direction, even faster in the left direction with the fastest RT measure to the front. Significant differences in MT measures were observed between: 1) the simple and complex stimulus conditions, 2) the open and closed skill athletes, and 3) the four directions, with the MT measures slowest to the back, faster to the front, even faster to the right direction, with the fastest MT measures in the left direction. A significant interaction was achieved between the stimulus condition and the direction.

Thomas R. Burke
Health and Physical Education
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April 14, 1973
9:15 a.m.

EFFECTS OF MOVEMENT COMPLEXITY ON REACTION AND MOVEMENT TIMES IN CHOICE REACTION TASKS. Mary Lou Norrie, University of California at Berkeley.

The effects of movement complexity on one, two, and four choice reaction times were investigated. In addition, the effect of choice reaction situations on movement time was investigated. Two groups of 24 college age men volunteers from activity classes performed a choice reaction time task. One group performed using a simple 3 1/2 in. movement from the reaction button to the appropriate response button. The other group performed using a complex movement in which they first moved forward 11 in. to slap a button and then returned to the appropriate response button. Both groups performed 20 trials under each choice condition (one, two, and four choices). Standard Electric S1 timers were used to record reaction and movement times. To avoid confounding the results with changes resulting from practice only the last ten trials were used in analyzing the data. For the simple movement group reaction time increased significantly as the number of choices increased from one to two to four. For the complex movement group reaction time in multiple choice situations was significantly longer than for the simple one choice situation. However, the reaction time did not increase significantly as the number of choices increased from two to four. As the number of choices increased the effects of movement complexity on reaction time lessened in that significant differences were found for the one and two choice situations but not for the four choice situation. For the simple movement group there was some indication of significantly longer movement times in the multiple choice situation. For the complex movement group movement times were significantly longer for the multiple choice situations than the one choice situation. However, movement time did not increase significantly as the number of choices increased from two to four. The results indicated that most of the slow down occurred in the first part of the movement, although there was some evidence of trading off between the two parts of the complex movement.

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April 14, 1973
9:30 a.m.

Novel Skill Learning and
Gross Motor Performance Correlates

The purpose of this research was to determine the relative importance of various basic motor ability traits possessed by the learner in the process of acquiring neuromuscular skills. Fifty-two university students practiced two novel skills (ball toss and fli-back paddle ball) five days per week for two weeks. Motor performance scores on twenty-six reference variables were assessed prior to beginning practice. Factor analysis was employed to isolate basic factors underlying each practice sequence and the gross motor performance traits. Ten stable factors were isolated: two describing practice on each of the two novel skills and eight identified as involving gross motor performance. Comparisons of the factor loadings among practice stages for each novel skill across the eight motor performance factors suggested the following conclusions: (1) no relationship existed between gross motor factors and performance on the fli-back paddle ball skill, (2) gross motor factors were related to performance on the ball toss skill during early, but not late, stages of practice, (3) different gross motor factors related to performance on the ball toss skill as practice continued, (4) practice became the major factor explaining variation in performance for the ball toss skill as practice continued, and (5) performance on the ball toss skill should be assessed only after several practice periods to prevent previous experience from contaminating the skill assessment.

This study was supported in part by a faculty research grant at Stephen F. Austin State University, Nacogdoches, Texas.

Charles O. Dotson
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April 14, 1973
9:45 a.m.

THE MOTOR PERFORMANCE AND MOTOR LEARNING RATES IN THE NON-DOMINANT HAND OF CHILDREN AS A FUNCTION OF LATERALITY, AGE AND SEX. M. Kathryn Scott, University of California, Berkeley.

Sixty-four subjects were used to investigate the effects of laterality, age and sex on motor performance and motor learning of the non-dominant hand. For the pursuit rotor task, the target moved at a speed of 33 RPM, whereas the ball rolling task required that the subject roll a duck pin bowling ball on a strip of foam rubber aiming at a target line 18 feet away from the subject. The subjects were tested for lateral dominance by a 15 item laterality performance test. The results showed that the performance on the pursuit rotor with the left hand by right dominant subjects was, on the average, significantly better than the performance of the left dominant subjects with the right hand. With the ball task there was no significant difference in mean performance as a function of laterality. There were significant differences in mean performance on both tasks as a function of age and sex. In the learning scores, there were no significant differences between the mean scores at the start and the end of the two learning tasks indicated that learning, regardless of laterality, had occurred with each task for each sex at each age level.

M. Kathryn Scott
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April 14, 1973
10:00 a.m.

SPECIFICITY OF COINCIDENCE-ANTICIPATION. Paul Dunham, Jr., Earlham College and Harold L. Glad, Washington University, St. Louis.

The purpose of this study was two-fold: (1) to investigate the relationship between subjects' coincidence-anticipation performance employing four different appendages, and (2) to determine if there was a significant difference between the subjects' performances on the various appendages. Fifty undergraduates volunteered to serve as subjects for this experiment. Subjects were given 16 coincidence-anticipation trials, four each using his preferred hand, preferred foot, non-preferred hand and non-preferred foot. The apparatus was a 15 foot, 8 inch trough through which a small car traveled unobservable to subjects. Suspended from the bottom of the car and extending down was a 12-inch steel rod with a 2-3/4 inch styrofoam ball attached to the distal end. Subjects were required to release a spring switch the instant the ball coincided with a small metal flag. Subjects' score was determined as the difference between actual time and estimated time as recorded on .01 second LaFayette timers. Results indicated that subjects' performance using the four different limbs were virtually unrelated in agreement with the theory of task specificity. Analysis of variance: two-way classification for subjects tested under different conditions revealed no significant difference between performance of various limbs, $F = .711$ but indicated a significant difference between individuals' performances, $F = 2.163$.

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April 14, 1973
10:15 a.m.

SUPERSTITIONS OF CANADIAN ATHLETES: AN INTER-SPORT COMPARISON.

C. Jane Gregory and Brian M. Petrie, University of Western Ontario

Belief structures categorized as superstitions were investigated among members of six selected Intercollegiate athletic teams enrolled at the University of Western Ontario during the 1971-72 academic year. A mailed questionnaire was employed as the survey instrument and distributed to 174 athletes chosen by systematic random sampling from lists supplied by the Department of Athletics. The overall return rate was 73.26 per cent (team sport athletes 78.26%: individual sports athletes 68.42%). Using the Spearman Rank Correlation Coefficient to determine differences between rankings of superstitions in sub-groups, it was found that; (a) the rankings of general superstitions were substantially similar among team and individual sport athletes, (b) although the correlations on lists of general superstitions by sex and sport were statistically significant, there was greater similarity in the rankings of the female athletes, (c) the rankings for sport superstitions were similar between team and individual sport athletes, (d) there was a greater similarity in the rankings of sport superstitions among males. Team sport athletes provided greater support for superstitions related to equipment and its use, to order of entering arena or playing position, to dressing room activities, to repetitive rituals, and to sports personalities. Individual sport athletes gave higher support for superstition related to the wearing of charms, to lucky lane numbers, to team cheers, and to crossing oneself before participation. Sport superstitions were identified with particular activities, for example, (a) Hockey - equipment and order and player position, (b) Basketball - the sinking of the last warm-up shot, (c) Volleyball - travel superstitions, (d) Swimming - colour of suit, (e) Track - clothing, sox, lane no., and superstitions related to shoes, (f) Tennis - weather and lucky balls (by brand). The recourse to superstitious beliefs and practices as determinants of success or effective participation was found to be particularly prevalent among the athletes of the sample. The fact that 137 respondents endorsed 904 superstitions (with repetition) which could be grouped into 40 categories clearly indicated the strength of superstition in sport.

C.Jane Gregory
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April 14, 1973
10:30 a.m.

POLITICAL ATTITUDES OF ATHLETES AND NONATHLETES IN A CANADIAN UNIVERSITY SETTING. Brian M. Petrie, University of Western Ontario.

A variety of reports, both conjectural and scientific, as well as current beliefs of the youth counterculture, have identified university athletes as being more politically conservative than nonathletes. Such reports indicate little more than the attachment of a form of "global conservatism" to the athletes. The present study evaluated the political attitudes of students of the University of Western Ontario on several dimensions, (a) "global conservatism-liberalism" as measured by the McClosky Scale, (b) self-report assessment of one's own political ideology, (c) the Rehberg Scale of Political Activism, and (d) Likert scales measuring attitudes toward specific social and political issues related to political ideologies. A mailed questionnaire was employed as a research tool and distributed to, (a) 224 students selected by systematic random sampling from a list of male and female Intercollegiate athletes participating in the 1971-72 academic year, and (b) 227 nonathletes selected by the same technique from a list of male and female students registered for the same academic year. The overall return rate for the questionnaire was 64.96 per cent (athletes 66.96%: nonathletes 62.99%). Data were analyzed to determine prevailing political ideologies and differences between groups on athletic participation, academic programme, and sex. The results indicated that, regardless of measure employed or variable introduced, the athletes and nonathletes were predominantly liberal in their ideologies. These results applied to "global liberalism" as well as "issue-oriented liberalism". The results were interpreted to indicate, (a) rejection of the U.S. - data-based theoretical propositions regarding political beliefs of Canadian athletes, or, (b) intrusion of methodological problems such as a social desirability response set. The need for replication of the study was emphasized, particularly in the U.S., where more concern has been expressed regarding political ideologies of athletes in comparison with nonathletes in the university setting.

Brian M. Petrie
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April 14, 1973
10:45 a.m.

THE ATHLETE's DILEMMA: AN EXPERIMENTAL GAME USING A PRISONER'S DILEMMA PAYOFF MATRIX ADAPTED TO A PADDLEBALL TOURNAMENT, Theodore William Harmon Johnson, Ed.D., State University College at Brockport.

The "Athlete's Dilemma," (AD) is a two-person decision-making game involving two choices: 1) the choice of playing, or 2) the choice of not playing the third game of a paddleball match. If both players choose to play the third game, they both do better in tournament scoring than if both choose not to play, but the maximum payoff for each individual can be obtained only by choosing not to play the third game while the other person chooses to play. The AD was designed to serve as a research tool for observing cooperative and competitive behavior. The problem was to investigate the cooperative and competitive behaviors of physical education majors (PE), non-majors (NM), and varsity football players (FB). Forty-eight male volunteer subjects enrolled in the University of New Mexico were used. Four groups of twelve subjects each played round robin schedules. The experimental group play was arranged in the following manner: 1) PE vs. PE, 2) NM vs. NM, 3) FB vs. FB, and 4) PE vs. NM. An overall difference in group means was significant at the .01 level. Differences between the combined experimental group (PE-NM) and the football players; and between the combined group and the physical education majors were significant at the .05 level. The hypotheses that varsity football players would be more competitive than physical education majors and non-majors, and that physical education majors would be more competitive than non-majors were not supported at the .05 confidence level. Conclusions. The results of this experiment lead to the following conclusions: 1) The AD game is a functional research tool for the empirical observation of cooperative and competitive behaviors; 2) the environment in which an experimental game is conducted has some effect upon the manner in which subjects play; and 3) more studies must be made before generalizations about the AD play of independent populations can be made.

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April 14, 1973
11:00 a.m.

FIELD DEPENDENCE-INDEPENDENCE AND ATHLETIC TEAM CHOICE.

David Pargman, Boston University; Lynn B. Schreiber, Boston University.

Fifty-one "team" sport and sixty-four "individual" sport players were tested with the Hidden Figures Test (cf-1). Scores on this test are indicative of the perceptual characteristic of field dependence-independence, which in turn refers to the perception one has of himself in relationship to his surrounding field. Six additional variables were also investigated in order to determine their relationship to athletic team choice (age; academic semester; number of varsity athletic seasons for specific sport; age at which subject first began organized competition in sport; grade point average and major field of study). "Individual" sport athletes scored significantly higher on the Hidden Figures Test than "team" sport athletes, thereby indicating greater field independence. Academic semester and starting age of specific sport participation were observed to be significantly different according to "team" or "individual" sport affiliation, as well as among sport groups. Grade point average was observed to be a significantly differentiating variable among athletic groups, but not between "team" and "individual" athletic groups. Significant differences were also observed among various "college major" groups of athletic subjects.

David Pargman
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April 14, 1973
11:15 a.m.

A COMPARISON OF ATHLETES AND NON-ATHLETES IN THE APPREHENSION OF 'GAME STRATEGY' IN A COMPETITIVE AND COOPERATIVE LEARNING ENVIRONMENT. Linus J. Dowell, Texas A&M University

The purpose of this study was to compare athletes and non-athletes in the apprehension of 'game strategy' in a competitive and cooperative learning environment. Five hundred and fifty-two male Ss were divided alphabetically into sets of eight. Cooperation sets sat around a table or in a circle in a separate room from the Competitive Group. Each S in both groups was handed a play booklet with the target correctly placed in 12 game matrices. Both groups were to deduce the rules necessary for correct placement of the target. Cooperative Groups developed rules as a team while Competitive Groups developed the rules individually. All Ss were given a sheet of paper and pencil with which to record rules as they developed them. The rules were used as a guide in determining correct placement of the target in game matrices appearing on the final test. After twenty minutes, play booklets were turned in and test booklets and answer sheets were distributed. At the top of each answer sheet an Information Check List contained a place for subjects to check Athlete if they had earned a high school athletic letter and a place to check Non-Athlete if they did not earn a high school athletic letter. Answer sheets were graded and recorded on IBM cards along with Information Check List data. Comparisons were made between athletes and non-athletes under competitive and cooperative learning conditions by the BIMED, two by two ANOVA computer program. Athletes and non-athletes learn 'Game Strategy' to the same degree in a competitive learning environment as they do in a cooperative learning environment. Athletes do not learn 'Game Strategy' more readily than non-athletes in a competitive or cooperative learning environment. Athletes, in general do not deduce 'Game Strategy' more accurately than non-athletes.

Dr. Linus J. Dowell
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April 14, 1973
11:30 a.m.

CANONICAL RELATIONSHIPS AMONG PSYCHOSOCIAL FACTORS AND SPORT PREFERENCE. Andrew Yiannakis, University of California at Los Angeles.

The purpose of this study was to investigate whether sport preference is a random phenomenon or, it is related to specific factors in the background and environment of the participant. In addition, to explore the feasibility of forming a framework for the systematic analysis of this phenomenon by interrelating findings from independent investigators. A questionnaire was administered to 411 male and female participants in a voluntary sports program at the University of New Mexico in the spring of 1972. Information was obtained on such variables as social class, ethnic background, birth order and body esteem, among others. The Ss also indicated their degree of preference for seven selected sports. The data were treated by means of canonical correlation, a multivariate procedure which handles a large array of variables in sets rather than individually. Four meanigful canonical correlations were obtained of which the first two were significant beyond the .01 level. The first canonical relationship of .730 indicates that being male and being most competent in body contact sports is associated with indicating a preference for football. Variables contributing to the second relationship of .467 indicate that being of a higher social class and stressing the pursuit of vertigo is associated with sky diving, soccer and skiing. It was concluded that preference for specific sports is contingent upon a number of background and environmental factors being present and possibly interacting. Furthermore, this study revealed that by showing how a number of variables interrelate in a manner which permits the linking of these results at a higher theoretical level, a framework can be generated which may aid the systematic analysis of this phenomenon at both practical and theoretical levels.

Andrew Yiannakis
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April 14, 1973
11:45 a.m.

FACTORS RELATED TO THE PERCEPTION OF WORK EFFORT. Ernest D. Michael Jr., University of California, Santa Barbara

Subjects were asked to exercise on a treadmill for 5 minutes at 6 mph, 0% grade. Following this standard work effort, the grade was changed to 5% and the subjects asked to adjust the speed to exactly equal the standard effort. The treadmill speed was then set at 3.5 mph and the subjects were asked to adjust the slope so the work effort would equal the standard work effort. There were 12 male and 9 female subjects. Since the responses were similar between the male and female subjects, the data were grouped and the results analyzed. Results showed that there were insignificant differences in work effort when the subjects were asked to adjust the slope of the treadmill and higher energy costs, ventilations, heart rates and R.Q. levels when subjects were asked to adjust the speed to equate the standard effort. The ability to perceive a work load related to the cues from the heart rate and ventilation measurements when the speed of the run was changed and the grade was adjusted, however, the adjustment of the speed at the 5% grade was such that the subjects underestimated the work that was being done. The heart rate and ventilation measurements therefore did not act as cues in the estimation of work effort when the exercise was modified through changing the grade of running. Evidently the cues to the perception of work effort are affected following a change in the grade of running. It is hypothesized that the perception of effort is dependent on circulatory-metabolic cues unless impulses from the muscles are affected by grade running.

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April 14, 1973
9:00 a.m.

EFFECT OF SELECTED WARM DOWN WORK LEVELS ON BLOOD LACTATE REMOVAL

Gregory L. Dykstra, Richard A. Boileau*, James E. Misner,
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The practice of warming down following strenuous exercise is widely accepted; however, the physiological benefits of active versus passive recovery remain controversial. The purpose of this study was to investigate the effectiveness of inactivity and several levels of recovery exercise in removing blood lactate following a strenuous but submaximal exercise stress. The rate of blood lactic acid removal at five different recovery workloads and the maximal oxygen consumption ($\dot{V}O_2$ max) were determined in three subjects on the bicycle ergometer. During each of the five duplicated recovery tests performed by each subject, an eight minute stress at approximately 90% $\dot{V}O_2$ max was followed by a twenty minute period in which the subject recovered at one of the following exercise levels: rest, 25%, 40%, 55%, and 70% of the $\dot{V}O_2$ max. Blood samples were taken from a pre-warmed fingertip at five minute intervals during the recovery period. Additionally, oxygen intake and heart rate were determined periodically and the mechanical work performed was monitored continuously in both the initial 90% exercise stress and the selected recovery condition. The slope of the line relating the log of the five lactic acid concentrations to time for each of the five recovery workloads was compared to steady state heart rate, steady state $\dot{V}O_2$ and mechanical work done during recovery. The results obtained indicate that the disappearance of lactic acid was most rapid when the subject recovered within the following ranges: heart rates between 110 and 140, oxygen consumption at rates corresponding to between 25% and 47% of the $\dot{V}O_2$ max, and recovery workloads between 410 and 725 KPM/min. This study suggests that active recovery at a moderate exercise level, rather than passive recovery, most effectively reduces lactic acid in the blood, and therefore optimizes the warm down effect.

*Sponsor, AAHPER member

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April 14, 1973
9:15 a.m.

A STUDY OF THE RELATIONSHIP BETWEEN FIFTH AND SIXTH GRADE CHILDREN'S MAXIMAL OXYGEN INTAKE AND RUNNING PERFORMANCE AT SELECT DISTANCES. John M. Dunn, University of Connecticut.

The purpose of this study was to examine the relationship between fifth and sixth grade children's maximal oxygen intake and their running performance at distances of 600, 900, 1200, and 1500 yards. Additional sub-problems studied were: to establish a reliability coefficient for the distance run most related to maximal oxygen intake, and to analyze differences in running performance times and maximal oxygen intake by sex, grade and sex within grade. One hundred and ten children selected in equal numbers by grade and sex from four schools were included in the study. A parental permission form as well as successful completion of a pre-exercise physical examination were required of all subjects. All of the children were given a series of tests by the investigator and an assistant. The first test was a treadmill test in which the subjects ran for as long as possible so that their maximal oxygen intake could be determined. Three to four weeks later the children ran, for time, distances of 600, 900, 1200, and 1500 yards. Approximately two day intervals were permitted between running test. The order of the tests was randomly rotated so that possible training effects would not bias the results. The null hypothesis which stated that there is no relationship between the children's running performance and their maximal oxygen intake was tested by a multiple regression program. To analyze the first sub-problem, a reliability coefficient was determined for the run-walk distance most closely related to maximal oxygen intake. Forty-nine of the subjects at the last two schools tested were retested one week later at the 1500 yard run distance. Additional sub-problems investigating differences in run performance times and maximal oxygen intake by grade, sex, and sex within grade, were determined by an analysis of variance. The following conclusions were made: (a) The four running performance tests are equally, but not highly related to maximal oxygen intake; however, they are at present the best measures available for assessing the cardiovascular fitness of fifth and sixth grade children. (b) The 1500 yard run-walk is a reliable test. (c) The boys running times and maximal oxygen intake values were better than the girls; however, no real differences were found between grades.

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April 14, 1973
9:30 a.m.

THE EFFECTS OF SPECIFIC TRAINING UPON THE DIFFERENCE IN MAX $\dot{V}O_2$ SCORES BETWEEN TREADMILL AND BICYCLE ERGOMETER TESTS. Gary S. Pechar, Queens College.

The purpose of this study was to determine the extent to which training programs utilizing the bicycle ergometer or treadmill as the means of exercise would reduce the initial difference between max $\dot{V}O_2$ scores as measured by treadmill and bicycle ergometer tests. Sixty college-age males enrolled in elective physical education courses at Queens College volunteered as subjects. The subjects were randomly assigned into one of three training conditions: treadmill training, bicycle ergometer training or no-training (control). Subjects in the treadmill and bicycle ergometer training groups exercised 20 minutes per day, 3 days per week for 8 weeks at a work intensity which elicited a heart rate of 85% of each subject's maximum heart rate. Subjects in the control group did not participate in any training program. Max $\dot{V}O_2$ was measured before and immediately following the training conditions by means of a treadmill (Mitchell, Sproule and Chapman) and bicycle ergometer test (Astrand). The results showed that bicycle ergometer training produced a greater reduction in the mean difference between max $\dot{V}O_2$ scores as measured on the treadmill and bicycle ergometer when compared with treadmill training ($P < .05$) and no-training programs ($P < .01$). It was concluded that a training program utilizing the bicycle ergometer as the means of exercise significantly reduced the difference between max $\dot{V}O_2$ scores as measured by the treadmill and bicycle ergometer tests.

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April 14, 1973
9:45 a.m.

INSTRUMENTATIONS REQUIRED TO EXTEND THE OPERATING RANGE OF A PORTABLE RESPIROMETER. Joan M. Stevenson, University of Minnesota.

The purpose of this study was to investigate the necessary changes in a portable Respirometer to permit its usage under field conditions at maximal work levels. The equipment tested was a 10-lb. Max Planck Respiration Gasmeter, whose only specifications listed were volume accuracy ranges up to 60 litres per minute $\pm$ 1 l. Known volumes of 100-200 l. contained in a Tissot Tank were forced at one minute flow rate through the Respirometer, to test its accuracy in recording volumes. Known concentrations of oxygen were collected by way of the Respirometer in thermstically sealed plastic bags to test the accuracy of the collecting device used for the study. The testing condition used to evaluate the Respirometer at high work intensity was the Taylor three-minute Intermittent Treadmill Test with the Tissot Tank being used as a collecting device. The maximal oxygen consumption values of four female athletes was attained by this method. Then the Intermittent Treadmill Test was repeated at a maximal level using the Respirometer as a collecting device. In order to standardize the testing conditions as much as possible, the same headgear, mouthpiece and length and diameter of tubing was used with the Respirometer and with the Tissot Tank. Volume results showed that the Respirometer was consistent in its variation from 60 l., the stated specifications, up to 200 l. per minute. Gas analysis from the plastic bags of the Respirometer showed that even after a three to twelve hour delay the bags increased in oxygen concentration by only .053% due to the dead space and the transfer procedures, not leakage. In comparing the maximal oxygen consumption of the athletes from the Tissot Tank to the Respirometer, there was a decrease in mean value of 1.45cc/Kgm/min at a maximal level, which was caused by the slightly higher resistance with the internal mechanisms of the Respirometer. It would seem from these results that, if the Respirometer were constructed out of lighter materials and better headgear was designed, it could be converted into an instrument which could then record high sub-maximal and maximal levels of work during performance.

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April 14, 1973
10:00 a.m.

CHANGES IN $\dot{V}O_2$ MAX. RESULTING FROM BICYCLE TRAINING AT DIFFERENT INTENSITIES HOLDING TOTAL MECHANICAL WORK CONSTANT.

Edmund J. Burke, Jr. and B. Don Franks, Biokinetics Research Lab, Temple University.

Effects of different training intensities on $\dot{V}O_2$ max. were determined. Sixteen male Ss (ages 16 - 18) were randomly assigned to one of three training groups or a control group. The training groups trained three days/week on bicycle ergometers at different intensities (85%, 75% or 65% of max. HR) with all groups doing the same total mechanical work (2000 Watts per training session). ANCOV revealed significant differences ($P<.025$) between both 85% and 75% groups and the control group. No significant difference ($P>.05$) was found between the 65% group and the control group. Within the limitations of the study, it was concluded that when comparing between training intensities while holding mechanical work constant it is necessary to work at a minimum of 75% of max. HR to elicit significant changes in $\dot{V}O_2$ max.

Edmund J. Burke, Jr.
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April 14, 1973
10:15 a.m.

OXYGEN DEFICIT - OXYGEN REPLACEMENT RELATIONSHIP IN RUNNING.
Donald F. McMiken, The University of Texas at Austin; Forrest A. Dolgener, The University of Texas at Austin.

It was the purpose of this study to determine the O_2 deficit - O_2 repayment relationship in running for various durations to accumulate more conclusive evidence concerning the effect of duration of work on the O_2 deficit - O_2 repayment relationship. Oxygen uptake was measured on six male college students during baseline work of walking on a treadmill at 60 m/min., while running at 160 m/min., and again while walking at the baseline level. The duration of running for each trial was randomly selected from six to 16 minutes at two-minute intervals. Several shorter trials between one and three minutes were also administered. During running, 60-second samples of expired gas were collected during durations up to and including three minutes, and two-minute samples were collected during durations greater than three minutes. During the recovery baseline work of 16 minutes, expired gas was continuously collected in three two-minute samples and two five-minute samples. Results indicated an O_2 deficit - O_2 repayment ratio of approximately 2.7:1 for the steady state trials. The O_2 deficit was correlated with $\dot{V}O_2$ during work ($r=.78$ $P<.05$). Multiple linear regression analysis revealed no significant relationships of other variables to O_2 repayment. Limitations of the study, mainly sample size, prevented any firm conclusions from being drawn.

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April 14, 1973
10:30 a.m.

OXYGEN CONSUMPTION IN THE FIRST STAGES OF STRENUOUS WORK AS A FUNCTION OF PRIOR EXERCISE. Bernard Gutin, Kerry Stewart, Steven Lewis, Jacqueline Kruper, Teachers College, Columbia University.

This study examined the extent to which 10 minutes of prior exercise (PE) at a workload adjusted to maintain a heart rate (HR) of 140 bpm could facilitate the mobilization of the O_2 transport system in a strenuous criterion task (CT). The interval between the PE and CT was 30 seconds. The CT required the S to pedal for 2 minutes at a load of 1632 kpm/min. The control treatment involved completion of the CT following 10 minutes of rest on the ergometer. Comparisons between treatments were made during the 30 seconds between PE and CT, for four 30 second periods during the CT and for the 60 seconds following the CT. VO_2 was significantly higher following PE at ever stage except the second 30 second period of the CT and the 60 second post-CT period. Ventilation was significantly higher following PE at every stage except the last 30 seconds of the CT and the 60 second post-CT period. HR was significantly higher following PE at every stage. And O_2 pulse was significantly higher following PE only during the 30 second pre-CT period and the first 30 seconds of the CT, indicating that the PE facilitated the mobilization of stroke volume (SV) and/or A-V O_2 difference. The similar values for O_2 pulse during the last 90 seconds of the CT indicate that the higher VO_2 following PE was a function of higher HR, not higher SV or A-V O_2 difference.

Bernard Gutin
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April 14, 1973
10:45 a.m.

Optimal Measurement Schedules for Submaximal Oxygen Consumption Tests When Heart Rate Is The Criterion Measurement. John C. Holland, University of Houston; Andrew S. Jackson, University of Houston.

Heart rate is currently being widely used as the criterion measurement in submaximal oxygen consumption experiments. For such a practice to be valid, it must first be reliable. Therefore, this study examined the reliability of heart rate during a standardized submaximal oxygen consumption test. More specifically the study attempted to examine the sources of measurement error associated with such a test and to recommend optimal measurement schedules. A random sample of thirty-five males and a second random sample of thirty-two females were selected from two pools of University of Houston physical education students. All subjects were administered two trials of a standardized submaximal oxygen consumption test (3 KP for males and 2 KP for females) on two different days. Approximately seven days elapsed between the day trials with each experiment lasting seven minutes. The heart rates for the final 15 seconds of each minute of work were considered trials. A two factor ANOVA design with repeated measures on both factors was used to search for systematic sources of variation. Trend analysis was used to establish when the criterion measurements of heart rate stabilized. Intraclass reliability procedures were used to estimate the reliability of the heart rates for the selected measurement schedules that included: multiple trials within days and multiple trials between days. This study was replicated by analyzing both the male and female samples with the statistical findings being identical for both samples. The ANOVA revealed that both the between days and days-by-trials interaction were not significant. The component of trials produced a significant curvilinear trend with heart rate stabilizing during the fourth, fifth and sixth minutes. The intraclass reliability estimates were high for both samples.

John C. Holland
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April 14, 1973
11:00 a.m.

RELATIONSHIP BETWEEN INDIVIDUAL DIFFERENCES IN A STEADY PACE ENDURANCE RUNNING PERFORMANCE AND MAXIMAL OXYGEN INTAKE. Frank I. Katch, Gary S. Pechar, William D. McArdle, Arthur L. Weltman, Queens College.

The relationship between individual differences in a steady-pace endurance running test and maximal oxygen intake (l/min., ml/kg·min., ml/kg LBW·min) was determined in 25 college men. In the running test subjects attempted to maintain an initial running speed of 10 mph (4.89 yards/sec) for 10-minutes as they were paced around a 440 yd. track. Running performance was scored as running time between consecutive sections of the track, and an endurance score was calculated as the cumulated distance run during each minute. Max $\dot{V}O_2$ (ml/kg · min) correlated r = .61 with cumulative distance after 5 minutes of running. Validity correlations were only slightly increased by including minutes 8 to 10. Expressing Max $\dot{V}O_2$ in either l/min or ml/kg LBW·min did not improve the correlation. Percent drop-off in running speed from the initial pace averaged 16% at min 5 and 31% at min 10. Percent body fat correlated poorly with min-by-min performance (average r = .04), but was inversely correlated with 10 minutes of cumulative performance (r = -.48). At least 4-min of running was required to predict the 10-min cumulative performance criterion (r = .81; Sy·x = 13.2 yards); a 5-min run raised the correlation to r = .87 (Sy·x = 11.1 yards). Individual differences in min-by-min endurance performance were substantial throughout the run. These results suggest that a performance measure of running endurance, where all individuals begin running at 10 mph and attempt to maintain this speed for 10-min, should be continued for at least 5-min to achieve moderate validity.

Dr. Frank I. Katch
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April 14, 1973
11:15 a.m.

PREDICTION OF MAXIMAL OXYGEN INTAKE FROM ASTRAND-RHYMING TEST, 12-MINUTE RUN, AND ANTHROPOMETRIC VARIABLES USING STEPWISE MULTIPLE REGRESSION. George T. Jessup, Homer Tolson, and James W. Terry, Texas A&M University.

When used with normally distributed groups of subjects simple regression techniques, such as the Astrand-Rhyming Test and 12-Minute Run which are based upon the rectilinear relationship of heart rate to VO_2 or the relationship between physical working capacity and maximal oxygen intake, seem to differentiate fairly well among varying levels of cardio-respiratory fitness. If, however, volunteer subjects are tested with these instruments, the predictive validity may tend to fall in relation to the homogeneity of the group. Since these tests probably measure different aspects of cardio-respiratory fitness, it seemed reasonable to utilize multiple regression analysis to improve upon the predictions of the simple regression models. It was the problem of this investigation to compare the prediction of maximal oxygen intake with simple and with multiple regression models in young volunteer subjects. The subjects were 40 volunteer male college students 18 to 23 years of age (mean 19.5), 65 to 74 inches in height (mean 69.9), and 122 to 185 pounds body weight (mean 154.8). Each subject performed the Balke Treadmill Test of physical working capacity, at the end of which one-minute air samples were collected and analyzed for V_E with a dry gas meter and for percent CO_2 and O_2 with a Micro-Scholander apparatus. The Astrand-Rhyming Test and 12-Minute Run were administered approximately one week apart. The data were analyzed with a computer program that performed a stepwise multiple linear regression (UCLA BIMED 02R). MAX VO_2 ranged from 2.86 to 5.17 l/min (mean 4.21). The simple regression model predicting MAX VO_2 from that predicted by the Astrand-Rhyming Nomogram yielded a correlation coefficient of $r = 0.13$, possibly indicating sample homogeneity. The best multiple prediction equation, MAX VO_2 = 5.493 + WEIGHT(0.028) + ASTRAND-RHYMING(0.019) - HEIGHT(0.249) + LEG LENGTH(0.176) + 12-MIN RUN(0.336) + AGE(0.009), yielded a coefficient of $R = 0.824$. Stepwise multiple regression analysis appears to improve the prediction of MAX VO_2 in homogeneous volunteer subjects.

George T. Jessup
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April 14, 1973
11:30 a.m.

THE METABOLIC BASIS OF EXCESS POST-EXERCISE OXYGEN CONSUMPTION (THE O_2 DEBT). George A. Brooks, University of California, Berkeley.

Traditional concepts regarding the mechanisms held to be responsible for elevated rates of O_2 consumption after exercise (the O_2 debt) have been investigated and found to be in error. These conclusions have been reached:

1) Glycogen synthesis is not a dominant process in the immediate post exercise period;
2) Most lactate is not resynthesized to glycogen, but rather is oxidized or converted to blood glucose;
3) Exercise induced hyperthermia is an undeniable factor contributing to the magnitude of excess post-exercise O_2 consumption;
4) The term O_2 debt is a misnomer and has been replaced with the descriptive term "excess post-exercise O_2 consumption." Further, with these realizations, it will be necessary to reassess definitions of gross and net body efficiencies.

George A. Brooks
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April 14, 1973
11:45 a.m.

WOMEN'S BASKETBALL: AN HISTORICAL REVIEW OF SELECTED ORGANIZATIONS WHICH INFLUENCED ITS ASCENSION TOWARD ADVANCED COMPETITION IN THE UNITED STATES. Margaret R. Downing, Texas Woman's University.

A critical examination was made of the origin, purpose, membership, meetings, finance procedures, and powers and obligations of selected athletic organizations in the United States which influenced the rise of women's basketball toward advanced competition. The method of historical research was employed in the preparation and presentation of this study; facts from primary sources were obtained by reviewing all available official records, proceedings, correspondence, and reports related to the activities of the selected organizations: the Women's National Basketball Committee of the AAU (WNBC), the USOC for Women's Basketball (USOCWB), the National Girls Basketball League (NGBL), the AAU-DGWS Joint Rules Committee, and the National Institute of Girls Sports (NIGS). Findings indicated that the ascension of women's basketball in the United States was influenced by the following: 1) The crisis years of World War II changed attitudes and social customs regarding women in the United States. 2) Increased participation at the international level introduced the aspect of political pressure which served as a catalyst among various athletic organizations to accelerate women's basketball programs. 3) The establishment of a DGWS-AAU Joint Rules Committee in the early 1960s enhanced cooperation between the two organizations and apparently increased opportunities for participation by women. 4) Prominent NGBLcoaches served as catalyst to prod the AAU and DGWS toward major rule changes which greatly influenced team preparation at the international level. 5) The selection of a DGWS oriented woman as chairman to the powerful AAU National Women's Basketball Committee in 1964 provided continued momentum toward increased cooperative efforts between the two organizations. It was concluded that the crisis of World War II served as the prime factor which created a two-fold change of attitudes toward the role of women in the American society: that of woman's attitude regarding her own capabilities; and the attitude of society in general toward woman's new position in all facets of life outside the home environment. As social attitudes and customs have become more equal, opportunities for women in the United States to compete at advanced levels in basketball have increased proportionately.

Margaret R. Downing
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April 14, 1973
4:00 p.m.

WOMEN AS EDUCATORS/THE EDUCATION OF WOMEN: EDUCATION FOR AND BY WOMEN IN THE LAST DECADES OF THE EIGHTEENTH CENTURY WITH PARTICULAR REFERENCE TO THEIR VIEWS ON PHYSICAL EDUCATION (AMAR Y BORBON; WOLLSTONECRAFT; CAMPAN; GENLIS). Roberta J. Park, University of California, Berkeley.

Works authored by women who lived before the latter decades of the nineteenth century seem to be seldom considered in histories of physical education. Yet, there have been many women in earlier periods of history who have spoken out forcefully in favor of physical education and whose ideas, at least at the time they were enunciated, attracted a sizeable, and often, favorable audience. One such period is the last decades of the eighteenth century. Stimulated by the progressive and humanistic ideas of the Enlightenment, women in several countries advocated a more liberalized education for all children and, especially, an improved education for girls. The views held by such women did much to encourage the progress in education for women which Compayré lists as "one of the characteristic features of the nineteenth century-not less remarkable because of the important part which women, by their abstract reflections or in their practical efforts, have taken in the progress of pedagogy." Although many of the theories advanced by these women might today seem commonplace, it must be remembered that at the time of their writing many were remarkable if, indeed, not revolutionary. Using original texts, this paper intends to set forth the educational theories, especially those ideas concerning physical education, of four women who wrote during the last decades of the eighteenth century. All had experience, formal or informal, with educational activities. Mary Wollstonecraft and Jeanne-Louise-Henriette Campan established and conducted schools; Stéphanie Félicité du Crest, la Comtesse de Genlis, was tutor to a large group of royal children; Josefa Amar y Borbon was an active member of a Madrid Society concerned with the creation of primary schools. All four women stressed an improved education for girls; all emphasized the importance of healthy physical activities for girls; each in her own way exerted considerable influence upon her own society. All might reasonably be regarded as pioneers in physical education for women.

1. Gabriel Compayré, History of Pedagogy (New York: D.C. Heath and Co., 1885), pp. 478-479.

Roberta J. Park
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April 14, 1973
4:15 p.m.

PHYSICAL EDUCATION FOR WOMEN AT THE UNIVERSITY OF WISCONSIN, 1863-1913: A HALF CENTURY OF PROGRESS. Mary L. Remley, University of Wisconsin, Madison; Nancy Struna, Andrews School for Girls.

The development of the physical education program for women at the University of Wisconsin has a history which predates the actual establishment of a department by more than a quarter century. With the admission of the first females to the Normal School in the 1860's University authorities expressed interest in the physical welfare of women, but there is no evidence of any organized plan of physical training for them. Women students found their own outlets for recreational pursuits, primarily in the forms of hiking, cycling or croquet. Various individuals made sporadic efforts to offer programs of physical culture but these were short-lived. Miss Clara Ballard's voluntary gymnastics classes of 1889 proved to be the exception, however, and provided the foundation for a program which has been in existence for more than seventy-five years. During the period under study physical education for women appears to have four rather distinct, but overlapping stages of development: (1) Early concern of University officials for the health and physical well-being of females on the campus with no program implementation. (2) Development of individual recreational interests as leisure pursuits. (3) Participation in gymnastics classes offered on a volunteer basis. (4) Incorporation of calisthenics and sports and games into a University curricular requirement. Undoubtedly, the tenor of the times, a general increase in the emphasis on the physical welfare of women as well as the changing role of women in society contributed to this development at any stage. Not to be overlooked, however, were three additional major sources of support: (1) The women students, themselves, whose interest in and agitation for physical activities was evident throughout the period and who were a potent factor in securing space, equipment, facilities and teachers to satisfy their needs and desires. (2) The continuing support of activities for women from University officials, particularly the Board of Visitors, an advisory group to the Board of Regents with strong influence in matters of the University. (3) Faculty such as Clara Ballard, Abby Shaw Mayhew and Blanche M. Trilling whose indefatigable energy cannot be underestimated in the success of physical education for women at the University of Wisconsin.

Nancy Struna
Andrews School for Girls
Willoughby, Ohio

April 14, 1973
4:30 p.m.

THE EFFECTS ON MOTOR PERFORMANCE OF SETTING AN OVERT LEVEL OF ASPIRATION BY MENTALLY RETARDED STUDENTS. Bill Kozar, Texas Tech University.

The purpose of this study was to determine the effects of setting an overt level of aspiration (OLA) on the standing long jump performance of mentally retarded students. Based on research findings with students of normal I.Q. it was hypothesized that mentally retarded students setting an OLA would be striving for a clearly committed observable goal and their performance would be superior to mentally retarded students not setting an OLA. Forty mildly and moderately retarded students were randomly assigned to one of two groups: 1) OLA group, 2) control group. All students were given six standing long jump trials with from 60 to 120 seconds rest between trials. The long jump mat was clearly marked in feet and inches (lines and numbers) on both sides. The control group was simply asked to jump as far as they could on each trial. The OLA group was asked before each trial to point to a line on the mat where they actually expected to jump on the next trial. The study revealed that no statistically significant differences existed between the groups in standing long jump performance. The results further indicated that the OLA group failed to lower their discrepancy scores significantly over trials.

Bill Kozar
Department of Physical Education
Texas Tech University
Lubbock, Texas

April 15, 1973
12:00 noon

BILL BOWERMAN: CATALYST OF THE AMERICAN JOGGING MOVEMENT.

William H. Freeman, Gardner-Webb College.

Prior to the 1960's there was little organized jogging in the United States. Though some groups did practice running for fitness, such as the "Run-For-Your-Life" program of the YMCA, there was no readily available program known throughout the nation. Bill Bowerman, track coach at the University of Oregon, possessed a keen interest in physical fitness. During a trip to New Zealand late in 1962, he was introduced to a newly-popular activity called "jogging," practiced by groups of people of all ages who met regularly to run for fun and fitness. It was strictly non-competitive, with physical fitness as the primary goal. It was originated in that country by a prominent track coach, Arthur Lydiard, who had set out to organize groups of people into local jogging clubs. Bowerman ran with a club and discovered that he was in a very poor state of fitness. When he returned to the U.S. early in 1963, he immediately began speaking about his new discovery, starting with large groups of interested persons in Eugene, Oregon. After several weeks he realized the need to determine how much exercise the average adult needed. He joined forces with a local cardiologist, Dr. W.E. Harris, and gained the sponsorship of several groups, including the Oregon Heart Association, to research adult fitness in a carefully monitored jogging program. The results of the study, conducted during 1965-1966, were published in the A.M.A. Journal and were disseminated throughout the U.S. by the news media during 1967-1968. An early booklet explaining the jogging program was prepared by Bowerman and Harris, circulating widely after its appearance early in 1966. In 1967 the paperback book entitled Jogging appeared, and the interest in jogging as a fitness activity soon reached the "fad" level as multitudes of people attempted their own jogging programs. After 1968 Bowerman gradually withdrew from the public aspects of the jogging-for-fitness movement, feeling that he had made his contribution and was satisfied to let others continue the work. Though jogging did not last as a fad, it is still practiced widely, as seen by the newer books related to jogging and the similarly-oriented, but broader-based, book on Aerobics, which appeared about one year after the jogging book was published.

This paper is the outgrowth of a portion of a dissertation entitled A Biographical Study of William J. Bowerman, completed at the University of Oregon.

William H. Freeman
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Boiling Springs, N.C. 28017

April 14, 1973
4:45 p.m.

WALTER J. WITTICH: PHYSICAL EDUCATOR, 1885-1953.

Anna Beth Culver, University of Wisconsin-La Crosse.

The career of Walter Wittich was, in great measure, the motivating influence which brought national prominence to the Division of Health, Physical Education and Recreation to what is now known as the University of Wisconsin-La Crosse. Although the first physical education building on the La Crosse Campus—Wittich Hall—was dedicated to him, no other recognition appears in evidence to remind us of his importance in the field. The purpose of this research was to locate and assemble the material relevant to W. J. Wittich's training, show the contributions he made to the area of health, physical education and recreation at La Crosse State College, and demonstrate his interest and influence in state and national physical education affairs. In addition, it was hoped an insight into his philosophy and character might be discovered. The historical method of research was employed to collect all primary source materials which included personal documents, diaries, and letters, as well as books written by and about him. Other pertinent historical evidence included correspondence and interviews with those who knew him personally, both students and peers, throughout the country. The results of the research indicate that his administration encompassed six revisions of the physical activity offerings, saw the introduction of a four year course in physical education and the acceptance of academic minors, implemented the recreation major, and laid the ground work for graduate studies in physical education. Evidence of his contribution to the field of physical education and health can be found in the writings published in state and national publications and in speeches presented at meetings and conventions of the association. His community service, assisting the Red Cross and the War Effort during World War I and II, was unlimited. During the years 1917-1953, he was an inventor, a writer, a leader and a teacher who instilled professional attitudes and competence in the students planning to be teachers in the area of physical education. The impact of his career is felt by students, the university and the community, and the physical education profession generally, and is exemplary of the contributions of a dedicated physical educator.

Anna Beth Culver
Dept. of Physical Education-Women
University of Wisconsin-La Crosse
La Crosse, Wisconsin 54601

April 14, 1973
5:00 p.m.

THE ROLE OF GEORGE LOUIS MEYLAN, M.D., IN THE AMERICAN PHYSICAL EDUCATION MOVEMENT. Richard G. Wettan, Queens College of the City University of New York.

The purpose of this project was to investigate the role of Dr. George L. Meylan in the American physical education movement and to assess Dr. Meylan's role in terms of the age in which he lived and the profession in which he served. In addition this project attempted to arrive at a better understanding of the ideals, beliefs, practices and importance of Dr. Meylan. In order to tap the best available sources numerous friends, relatives, colleagues and contemporaries of Dr. Meylan were contacted in person, by telephone or through letters. An exhaustive search was made to uncover all of Dr. Meylan's writings and references to Dr. Meylan or his work. Particularly helpful were the Marsh Memorial Library at Springfield College, Columbia University Library in New York, the American Camping Association Library in Bradford Woods, Indiana, the National Young Men's Christian Association Library in New York and the Ohio State University Library. Dr. Meylan was an intimate friend of many of our early pioneers and he served in various organizations with these leaders. Meylan's record of organizational service can be matched by few men. Meylan was a stalwart fighter against commercialism in athletics and camping and through his writing and teaching he helped many to see the educational value of physical education, athletics and camping. Perhaps the main reason why Meylan is relatively unknown is that he never had graduate prodiges to carry his name or his work forward.

Dr. Richard G. Wettan
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April 14, 1973
5:15 p.m.

A VIEW OF THE PROFESSED SELF-CONCEPT AND PERSONALITY TRAITS OF INTERCOLLEGIATE WRESTLERS AND BASKETBALL PLAYERS.* Owen J. Holyoak, Robert E. Allen, Clifford A. Boyd, Paul J. Wittmer, University of Florida

The purposes of this investigation were: 1) to determine if differences exist between college wrestlers and college basketball players on sixteen professed self-concept factors and sixteen personality factors; 2) to determine if differences exist between the actual results of a personality factor test and those predicted by college wrestlers and basketball players. The subjects were 29 prospective members of the varsity wrestling team and 22 prospective members of the varsity basketball team enrolled at the University of Florida during the fall quarter 1971. Each subject was asked to rate himself on a scale ranging from one to ten on the sixteen factors identified by the Cattell 16 Personality Factor Test. The factors were analyzed independently and the results were judged to be an indication of the subject's professed self-concept. The subjects were then asked to complete the Cattell 16 PF Test in order that a more extensive profile of the sixteen personality traits could be developed. To insure testing uniformity, subjects were given standardized instructions prior to the administration of the tests. The data were analyzed using the Wilcoxon Rank-Sum Test and appropriate t-test. The .05 level of significance was accepted for all statistical analyses. The results indicated that the basketball players used in this study were significantly (P = .05) more tender-minded, sensitive, and sociable than the wrestlers. The wrestlers' personality traits were found to vary from the prediction of their own professed self-concepts, while the basketball players as a group saw themselves as average on the majority of the predicted self-concept factor.

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* This study was supported, in part, by the College of Physical Education, Health, and Recreation at the University of Florida

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April 14, 1973
4:00 p.m.

THE EFFECT OF A FOOTBALL SEASON ON THE PERSONALITY OF HIGH SCHOOL ATHLETES. Thomas D. Thomes, R. John Young & A. H. Ismail, Purdue University.

The purpose of the study was to investigate the effect of a competitive football season on the personality dimensions of high school varsity football team players (n=50). Personality data were collected using the Cattell 16 P.F. Questionnaire. Each player was ranked according to general football ability on the basis of a coaches' rating. The t-test was used to compare: (a) the initial and final sten scores of the total group, (b) the high and low ability groups (n=12 each) initially and finally, and also (c) the initial and final sten scores of the high and low groups. It was found that: (1) when the total group was compared initially and finally, no significant differences were observed; (2) at pre season testing the high and low ability groups differed significantly on factors C - emotional versus mature and L - trustful versus jealous--the low ability group conforming to the test score norms on both factors; (3) at post season testing the high and low groups differed significantly on factor I - tough versus effeminate; (4) the high ability group differed significantly between initial and final testing on the same factor suggesting the observed personality modification was restricted to the high group, and (5) no significant difference existed between the pre and post scores of the low ability group on any of the 16 personality factors. On the basis of these findings, it was concluded that the personality of high ability varsity football players may undergo subtle modifications during a competitive football season while the low ability players appear unaffected in terms of personality modifications.

Thomas D. Thomes
Central Catholic High School
Lafayette, Indiana

April 14, 1973
4:15 p.m.

THE RELATIVE EFFECTIVENESS OF TEACHER FEEDBACK UPON MOTOR SKILL WHEN UTILIZING VIDEOTAPE RECORDING. Dr. Robert E. Kraft, Christopher Newport College of the College of William and Mary

It was the purpose of this study to determine the effects of teacher feedback upon motor skill when utilizing videotape recording in the activity of bowling. The combination of teacher feedback and videotape recording was compared to each method in operation singularly. The study included a total of 45 male undergraduate students enrolled in bowling classes at Syracuse University during the 1971 Fall semester. All subjects had previous bowling experience. Each subject was randomly assigned to one of three experimental treatments based upon a pre-test score in bowling. The pre-test consisted of the total pinfall for four trials or 40 frames in bowling. The treatment groups consisted of a teacher feedback group, a videotape recording self-analysis group, and a combination group of teacher feedback and videotape recording. Each treatment group received an identical amount of bowling instruction, bowling activity, and feedback. The subjects participated in bowling twice a week for 12 weeks. Each subject bowled two trials each meeting. All subjects received the appropriate feedback for their group based upon one frame of bowling each class meeting. Two instructors provided the feedback to the two teacher feedback groups, and each subject had equal exposure to each instructor. The data were based upon each treatment group's mean bowling score in terms of the total weekly pinfall. A chart of progress was developed for each treatment group based upon the mean weekly pinfall in order to compare the improvement patterns of each group. The proposed design employed to analyze the data was analysis of variance for repeated measures. The primary purpose of this analysis was to determine if any significant differences occurred between the treatment groups in bowling skill. Multiple t ratios were used in order to make comparisons among the means in the final test. The results of the analysis of data revealed the following findings: 1. There were significant differences between the three treatment groups in bowling skill at the .01 level. 2. There were significant gains achieved in bowling skill across the treatment groups at the .01 level. 3. There was a significant difference in the improvement of bowling skill at the .05 level favoring the combination teacher feedback and videotape group when compared to either the teacher feedback group or the videotape self-analysis group in the final test. 4. There was no significant difference in bowling skill between the teacher feedback group and the videotape self-analysis group.

Dr. Robert E. Kraft
Christopher Newport College of the
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Newport News, Virginia 23606

April 14, 1973
4:30 p.m.

STIMULUS VARIATION AND LEARNING FROM LECTURE. Winnefred L. Wyckoff, Oregon State University.

The objective of the study was to determine the effect of teacher movement and gesturing while lecturing, on student recall of the factual information presented. Twelve pre-service teachers and 48 public school students were randomly selected from a Micro-teaching Clinic. The teachers were video taped using high and low levels of stimulus variation while lecturing. Student test scores were analyzed to determine Treatment, Lecture, and Order effects. Increases in the frequency of teacher movement and gesture resulted in improved performance by secondary students on both lecture tests, $r = .62$ and $.92$ respectively. Elementary student performance was significantly lowered by an increase in stimulus variation, $r = -.91$ and $-.97$ respectively. The conclusion was that the stimulus variation tested in this study had significant but differential effects upon secondary and elementary students.

Winnefred L. Wyckoff
Department of Physical Education
Oregon State University, Corvallis, Ore

April 14, 1973
4:45 p.m.

COMPARISON OF TWO METHODS OF TEACHING GOLF. Danny R. Mason, Texas Tech University; John E. Burkhardt, Texas Tech University.

The purpose of this study was to investigate the effects of two methods of teaching golf. The subjects were sixty-three male college students enrolled in beginning golf, had played no more than three rounds of golf during their life and had received no previous golf instruction. Before instruction was begun each group was given written copies of the general rules of golf and received one and one-half hours of group discussion regarding rules, etiquette, and general playing procedures. All subjects were required to play nine holes of golf and present an attested score card with two signatures before their first instructional period and again during the last class meeting of the semester. Group one, which consisted of thirty-seven subjects, was taught the basic fundamentals of golf by the traditional method of starting with the eight or nine iron and practiced with eight or nine irons for the duration of the semester. Group two, which consisted of twenty-six subjects, was taught the basic fundamentals of golf by beginning with the number three wood and practiced with the number three wood for the duration of the semester. The subjects met for sixteen periods, one and one-half hours in length. In addition to the above mentioned instruction, all subjects spent one and one-half hours on the putting green receiving instruction and practice in putting and one and one-half hours of instruction in chipping and approach shots to the green. It was found through the use of the analysis of variance technique that the mean nine hole and mean eighteen hole scores for the two groups were not statistically different prior to or following the instructional period. Comparison, using the t-test, did reveal that both groups did make significant improvement on their golf scores on both nine hole and eighteen holes. It was concluded that either the three wood or the short irons could be used as the primary teaching tool in beginning golf classes at the college level.

Danny R. Mason
Department of Physical Education
Texas Tech University
Lubbock, Texas

April 14, 1973
5:00 p.m.

THE DEVELOPMENT OF A GOLF PUTTING TEST. Lea Larson, Oklahoma State University.

The purpose of this study was to develop a valid and reliable indoor golf putting test. Subjects of two skill levels were examined throughout the study, beginning and intermediate golfers. Forty-two beginners and twenty-six intermediates participated in the study. During the putting grid test each subject took twenty trials from each of five predetermined distances (four, eight, twelve, sixteen, and twenty feet respectively) to a cup imbedded below the surface of a strip of G-50 Astro Turf. The target, the cup, was surrounded by a grid. The lines in the grid were four and one fourth inches apart. The target was given a 0, 0 value. Each square was given a number pair (1,1; 1,2; 6,6; etc.) to designate the coordinates of that particular square. Each trial was recorded both graphically and numerically on the subject's score card. Following the testing session the pairs of numbers were translated to what was known as a "converted score." The converted score for each trial was the distance from the center of the square that the ball stopped in to the center of the hole. The formula $c = 4.25(a^2 + b^2)$ was utilized to convert the raw score to the converted score. The coordinates of each point were a and b. The "test converted score" was the total of the twenty converted trial scores for each test distance. The practice putting green test consisted of twenty predetermined holes on a practice putting green. The subject's score for each hole was indicated by the number of strokes required to putt the ball into the hole. The total number of putts required for all twenty holes composed the subject's practice putting green test score. Reliability was determined by the test-retest method. Validity was established by comparing each subject's score on the putting grid test with the total score for the practice putting green test. Reliability and validity were determined for the first ten trials, the first fifteen trials and for the twenty trials. The fifteen trial putting grid test from twelve feet was the most valid test for the beginning group (0.4692). The ten trial putting grid test from four feet was the most reliable test for the beginning group (0.7327). The twenty trial putting grid test from eight feet was the most valid test for the intermediate group (0.4583). The fifteen trial putting grid test from four feet was the most reliable test for the intermediate group (0.9107).

Lea Larson
Austin Peay State University
Clarksville, Tennessee 37040

April 14, 1973
5:15 p.m.

INTRA-INDIVIDUAL VARIABILITY OF NORMAL AND EDUCABLE MENTALLY RETARDED BOYS ON A TEST OF THROWING ACCURACY. D. Alan Dobbins, University of California, Berkeley.

The purpose of this study was to compare the intra-individual variability, the reliability of intra-individual variability, and the relationship between intra-individual variability and performance of a group of educable retarded boys (N = 71. CA = 102± 11.9 months) and a group of normal boys (N = 71. CA = 100.7± 13.9 months) on two overarm accuracy throwing tasks. The throwing tasks were designed to assess independently the vertical and the horizontal components of throwing accuracy. A 6 foot target area divided into 15 parallel and equal zones (4.8 inches wide) was constructed for this purpose, the horizontal component of accuracy assessed with the target oriented so that zones were parallel to the ground, the vertical component assessed with the target rotated 90 degrees, the parallel zones then being at right angles to the ground. The subject was directed to aim all throws at the center zone. Twenty-eight trials were given under each condition; the scoring system used assigned a score of zero for trials in which the center zone was hit, one point for each zone progressively farther away from the center zone. The mean intra-individual variability of the retarded group on both tasks was significantly greater (.01 level) than that of the normal group. Split-half reliability coefficients for intra-individual variability ranged between .73 and .89 for both groups on the two tasks. The level of performance was expressed a) as the constant error (CE) and b) as the average error (AE). The correlations between CE and intra-individual variability f r the two groups were low for both tasks. When level of performance was expressed as the AE all correlations were .90 or higher.

D. Alan Dobbins
Department of Physical Education
University of California
Berkeley, California 94720

April 15, 1973
11:00 a.m.

THE RELATIONSHIP OF SELECTED DEVELOPMENTAL VARIABLES IN EMR CHILDREN. Wendell P. Liemohn, Indiana University.

The purpose of this study was to determine if relationships existed between selected (1) gross motor, (2) cognitive/fine motor, and (3) behavior/social variables in educable mentally retarded children. The sample consisted of the children enrolled in the Indiana University Developmental Training Center (DTC) programs in 1972. The children ranged in age from 6-12 years, and included 15 girls and 33 boys. Because some of the children were in residence for as short a period as two weeks, and because of the continual modification of our testing program, approximately one half of all the children were evaluated on (1) all of the behavior/social variables and (2) IQ; a minimum of 75 per cent of all the children were evaluated on all of the fine and gross motor variables. In addition to being retarded, many of the children had behavior disorders. The gross motor items administered included the Cratty Gross Motor Test and selected items from the AAHPER-Kennedy Foundation Special Fitness Test. The cognitive/fine motor tests administered included the Wechsler Intelligence Scale for Children and the Developmental Test of Visual-Motor Integration. The behavior/social tests utilized included the DTC Behavior Checklist and the Vineland Social Maturity Scale. Also included in the correlation matrix were the physical components of age, sex, height, and weight. As expected, many high intra-correlations were found within each group of variables. In addition, significant inter-correlations were found between several of the gross motor items and the cognitive/fine motor items. A few relationships were also found between the aforementioned two categories and the behavior/social items. It would appear that in EMR children in this study there are: (1) relatively high relationships between certain gross motor and cognitive/fine motor abilities, and (2) indications of relationships between (a) behavior/social variables and (b) motor ability.

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April 15, 1973
11:15 a.m.

THE EFFECTS OF COACTION AND SELECTED GROUPING PROCEDURES ON THE LEARNING AND PERFORMANCE OF A MOTOR TASK BY EDUCABLE MENTALLY RETARDED PUPILS. Linda Sue Hansen, S.U.C. Brockport.

The fifty four educable mentally retarded Ss consisted of pupils who were between the ages of 11 and 16 and had I.Q.'s ranging between 50 to 75. Thirty six of the above Ss were paired and randomly assigned to one of the three following -groups: (1) intra-class group (Ss in the same class), (2) inter-class group (Ss from two different classes), and (3) alone group. Each of the additional 18 Ss were paired with one of the Ss in either the intra-class group or the inter-class group when it was necessary to create an inter-class pairing within specific sub-groups. Each of the groups consisted of two sub-groups. Ss in each sub-group were tested in two different phases. The first phase was according to the criteria which had been established for learning; the second phase was according to the criteria which had been established for performance. The criterion established for both phases were represented by a predetermined number of trials. Results from pilot work indicated that ten trials were sufficient for Ss to learn the task. In order to investigate what effects coaction and selected grouping procedures had on learning and performance, a novel task was required. A tapping test was the selected task. Ss were given ten trials for phase I (learning) and phase II (performance). Results of a repeated measures ANOVA technique indicated that learning had continued into the second phase of testing. Results of an analysis by means using the means of the first and second set of trials as criterion scores produced significant results only in factor A (phase I and phase II). Since there were no significant differences with factor B (groups) and factor C (sub-groups), the significant results in factor A were contributed to the practice effects of the first ten trials. It was concluded that coaction and selected grouping procedures, as employed in this investigation, did not have a significant effect on the learning of a simple motor task.

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Maple Shade, New Jersey 08052

April 15, 1973
11:30 a.m.

THE EFFECTS OF A PROGRAM OF MODERN EDUCATIONAL DANCE ON THE PERCEPTUAL-MOTOR SKILLS AND PSYCHOLINGUISTIC ATTRIBUTES OF TRAINABLE MENTALLY RETARDED CHILDREN. John Arwyn George Gittins, University of California

Current theories, associated with the names of Kephart, Doman and Delacato, among others, suggest a progressive hierarchy of skills from motor, through perceptual to cognitive. The aim of the present experiment was to determine the effect if any, of a period of modern educational dance on measurable physical, perceptual-motor, psycholinguistic and intellectual skills of trainable mentally retarded children attending a public special education school. Sixty TMR children were randomly allocated to three groups. One group (Experimental) received sessions of modern educational dance three times weekly for a period of twelve weeks; the second group (Hawthorne) had quiet classroom activities (records, story-telling, games and films, etc.); the third group had no extra activities. At the end of the experimental period all children were tested for perceptual-motor skill (Cratty, Los Angeles P.M.A. Test), body image (Goodenough, Draw-a-Man), psycholinguistic (I.T.P.A.) and intellectual (WISC) skills. Differences in post treatment performance between the three groups were tested by analysis of co-variance. Three of the tests discriminated in favour of the experimental group, namely Visual Closure (I.T.P.A.), Gross Agility (Los Angeles P.M.A. Test) and Draw-a-Man (Goodenough). No significant differences were found for the other tests administered. It might be that a longer period of treatment would have yielded more extensive effects, but in the given experimental conditions of this inquiry, gains were restricted to skills which clearly have elements in common with modern educational dance.

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April 15, 1973
11:45 a.m.

DEVELOPMENTAL CHANGES IN MOVEMENT CHARACTERISTICS OF THE PUNT*

Alison Poe, University of Northern Iowa

The purpose of this longitudinal study was to determine the changes in movement characteristics of the punt in one subject over an eight year period. The data was from a longitudinal study by Dr. Lolas Halverson at the University of Wisconsin. Film records of the performance of the punt were obtained for one boy from the age of 2 years, 9 months through 11 years, 4 months. Fifteen film records were made at 3 month intervals through ages 3 and 4; at 6 month intervals through ages 6 and 7; and, at one year intervals through ages 8 to 11. Movement characteristics studied included: the steps in the approach to the kick, the release of the ball, arm and leg action, trunk action, timing relationships between segment actions, angular velocities of the thigh and knee, and variability of the traits at various age levels. Findings revealed the following developmental changes:

1. The approach to the kick progressed from one short, wide step at early ages to a two step, long stride sequence with a brief flight period prior to contact at the final age studied.
2. Ball release preceded placement of the support foot at every age with the length of time prior to placement increasing with age.
3. At earliest ages, both arms dropped to the sides following release; marked arm-leg opposition appeared at about 4 years of age and remained a consistent trait.
4. Angular velocity of the kicking knee showed incremental changes until measures comparable to adult data were observed at age 8.
5. All traits tended to show less variability with age.

Four levels of development were tentatively identified on the basis of the observed changes in movement characteristics.

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*This study was supported in part by a grant from the Wisconsin Alumni Research Foundation and was conducted in the Motor Development and Child Study Center at the University of Wisconsin, Madison.

Alison Poe
University of Northern Iowa
Cedar Falls, Iowa 50613

April 15, 1973
11:00 a.m.

EFFECT OF ANGLE OF RELEASE ON THROW FOR DISTANCE TEST. Lynn W. McCraw, The University of Texas at Austin.

The purpose of this study was to determine the effects of the angle of the throw for distance test. An examination of test directions in the literature revealed none that included the stipulation that the throw should be made at a 45-degree angle. The softball throw for distance test was administered on three successive class sessions to 99 seventh-grade, 101 eighth-grade, and 87 ninth-grade boys. Three throws were allowed during each of the three administrations and each one of the three scores was recorded. The angle of the throw was also recorded as 45 degrees, less than 45 degrees, or more than 45 degrees. No mention was made of the angle of the throw during the first and second administrations, whereas prior to and during the third administration, subjects were instructed to throw at a 45-degree angle. The t-test was used to compare performance of the groups on successive days. Comparisons were also made of the best scores obtained while throwing at 45-degrees, less than 45 degrees, and more than 45 degrees. Subjects were classified as excellent, fair, or poor on the basis of their performance and mechanics of throwing, and an analysis was made of the proficiency in throwing at the proper angle before and after receiving specific instruction. Throws made at an angle of 45 degrees were significantly greater than those made at more or less than 45 degrees. Mean differences were 7.78, 12.71, and 14.58 for the 7th, 8th, and 9th grades respectively. Subjects responded to instruction relative to the angle of the throw since 57 percent of the throws during the third administration were at 45 degrees as compared with 37 percent during the second administration. A substantially larger proportion of students rated as excellent threw at the correct angle than did those rated as fair or poor. The means of the third administration were significantly larger than those for the second administration; however, the improvement was as large from the first to the second administration for students in the 7th and 8th grade suggesting that differences were due to factors other than the angle of throw.

Dr. Lynn W. McCraw
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April 15, 1973
11:15 a.m.

THE INFLUENCE OF OBJECT SIZE, SPEED, DIRECTION, HEIGHT, AND DISTANCE ON THE INTERCEPTION OF A MOVING OBJECT.

Forty boys and forty girls, enrolled in second grade, participated in a study assessing the influence of a moving object's distance, size, direction, height, and speed and the subject's sex on the interception of a moving object. An experimental apparatus was designed to permit spherical objects of two sizes (six inch and eight and one-half inch diameters) to move two directions (center and side) and three heights (high, middle, and low) for distances of either eight feet or sixteen feet at either a fast or slow speed. The child's task was to strike the moving object with a paddle before the object moved eight or sixteen feet. The object moved toward one of six points, which were equally within the subject's reach. A paddle with a five-inch disc and a two-inch extension in the handle beyond the four-inch grip permitted the child to reach the object before it moved eight or sixteen feet and then stopped. A successful object interception was made only when the child hit the ball before it stopped. The determination of a successful object interception was accomplished by comparing two time points recorded on a two channel recorder: one (1) channel indicated the time point when the object moved either eight or sixteen feet; and the other channel indicated the time point when the subject's paddle contacted the object. The comparison of these two time points revealed the success of the child's object interception. Frequencies of object interception were compared for both sexes for all the object distances, sizes, directions, heights, and speeds within the study. Analysis of variance indicated the frequency of object interception was influenced by the subject's sex, and the object's distance, direction, height, or speed within the following significant interactions: distance by direction, distance by height, size by direction, direction by height, height by speed, distance by direction by speed, size by sex by speed, and distance by direction by height by speed. All the main effects, except object size, were significant.

Marcella Davis
Department of Physical Education
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April 15, 1973
11:30 a.m.

CASE STUDIES IN THE DEVELOPMENT OF ONE-HANDED STRIKING*

Christine J. Harper, University of Wisconsin-Madison, Nancy Struna, St. Andrew's School for Girls, Willoughby, Ohio

The purpose of this report is to describe the movement characteristics of a three year old boy and girl as they performed a one-handed striking task over a one-year period. Observations were made at 4 month intervals as part of a filmed, longitudinal study on the development of motor patterns directed by Lolas E. Halverson, University of Wisconsin-Madison. The one-handed striking pattern was elicited by asking the children to hit a suspended ball as hard as possible toward a wall. The sequence and timing of joint actions were studied using tracings of selected trials taken from 16mm. film. Over the year the girl's pattern changed 1) from no weight shift to a shift of weight with a step toward the ball, and 2) from initiation of the forward motion of the racket with horizontal adduction of the striking arm to initiation of the motion using simultaneous pelvic and spinal rotation. Two major changes observed in the boy's pattern were 1) a progressively longer stride toward the ball with the contralateral leg, and 2) a progressively greater differentiation of pelvic and spinal rotation out of simultaneous pelvic-spinal rotation. Additional movement characteristics observed include 1) those which varied within subjects' performances (length of stride, range of movement), 2) those which varied between but not within subjects' performances (grip, joint action in the legs, wrist action at and through contact), and 3) those which showed little variation both within and between subjects' performances (head position, joint action at the wrist and shoulders during the backswing, closed eyes at contact).

*Supported in part by a grant from the Wisconsin Alumni Research Foundation and conducted in the Motor Development and Child Study Center, Department of Physical Education for Women, University of Wisconsin-Madison

Christine J. Harper
Lathrop Hall
University of Wisconsin-Madison

April 15, 1973
11:45 a.m.

THE EFFECT OF GUIDED PRACTICE ON OVERHAND-THROW BALL VELOCITIES OF KINDERGARTEN CHILDREN* Lolas E. Halverson, Mary Ann Roberton, M. JoAnne Safrit, Thomas W. Roberts. University of Wisconsin Madison, Wisconsin.

This report, the first of three on the effects of teaching kindergarten children the overhand throw, compares the children's final ball velocities to those of two control groups. Later reports will discuss the effect of instruction on the children's movement processes, and the relationship between velocity and movement process. Forty-five children from two intact kindergartens in a Madison, Wisconsin public school were randomly assigned by sex to (1) an experimental group which received a movement program including 120 minutes of guided practice in the overhand throw; or (2) a control group which received the same movement program but no exposure to the throw. A third group (N=24), randomly selected by sex from a comparable school, received no movement experience. Ten, side-view, filmed trials (16mm. - 64 frames/sec.) of each subject's throw for force were taken before and after a six-week period. Ball velocities for each trial were recorded simultaneously with the Roberts' velocimeter. Since one-way ANOVA's on both the pre and the post test velocities for each sex within each treatment group revealed no significant practice effect over ten trials ($p < .05$), the trial mean was used as each S's score. A two-way ANOVA (treatment x sex) indicated no significant difference between treatment groups ($p < .05$) at the beginning of the experiment. A two-way ANOVA (treatment x sex) for the post-test data still indicated no significant velocity difference ($p < .05$). Boys had significantly greater velocities than girls at both the pre and post-testing ($p < .05$). One hundred twenty minutes of guided practice in the overarm throw did not significantly change the ball velocities of kindergarten children compared to two groups with no formal throwing experience.

*This study was supported in part by a grant from the Wisconsin Alumni Research Foundation and was conducted in the Motor Development and Child Study Center, Department of Physical Education for Women, University of Wisconsin-Madison

Lolas E. Halverson
Lathrop Hall
University of Wisconsin-Madison

April 15, 1973
12:00 noon

AN ELECTROMYOGRAPHIC COMPARISON OF AN ISOKINETIC BENCH PRESS PERFORMED AT THREE SPEEDS. Mary Ridgway, Joel Rosentswieg, and Marilyn Hinson. Texas Woman's University.

Isokinetic exercise is based upon the control of speed during contraction rather than the amount of load (isotonic) or effort at a given angle (isometric). Isokinetic instruments typically provide a range of selectable speeds under the assumption that the slower the speed of movement the greater the potential resistance. The muscle action potentials (MAP) of the anterior deltoid, pectoralis major, biceps brachii, and the triceps muscle were studied by quantitative EMG during a bench press exercise at three controlled speeds. Bipolar surface electrodes with standard placement were employed throughout the study. Volunteer college women (N=11) performed 3 trials at each speed (1.5 sec., 2.0 sec., 3.5 sec./3 ft.) on a Super Mini Gym. All Ss were familiar with the exercise and the test procedures. Angles and hand grip were kept constant. Randomization of speed of contraction eliminated order effects and no verbal motivation was provided. Rest was controlled to negate fatigue. ANOVA and Duncan's Multiple Range Test were used to determine the significance of any differences obtained. The results indicated that the slower the speed of movement the greater the MAP output. In every instance each slower speed produced a significantly greater MAP ($P<.01$) than the compared faster speed except for the biceps brachii where the trend existed but was not significant for the moderate speed.

Appreciation to the Robar Mini-Gym Corporation of Independence, Missouri andthe Research Foundation of the Texas Woman's University for grants partially supporting this study is acknowledged.

Joel Rosentswieg
Texas Woman's University
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April 15, 1973
2:00 p.m.

ANALYSIS OF WINNING TIMES OF TRACK RACES FOR MEN IN MEXICO CITY 1968 AND MUNICH 1972. Ernst Jokl, University of Kentucky.

The winning times of the track running events for men at the 1968 Olympic Games deviated systematically from pre-Olympic world records: in all sprint events except the 110 meter hurdles new world records were established, while all races over 1500 meters or more were won in times below pre-Olympic world records. Between the end of the 1968 Olympic Games and the beginning of the 1972 Olympic Games not one world running record was improved. The winning times in the Munich 100 and 200 meters were slower than in Mexico City (10.1 vs 9.9 and 20.0 vs 19.8 seconds). But the performances under comparison were equal or better because electronic measuring devices were used for the first time in 1972; thus a correction factor of 0.2 seconds must be applied to the results to render them comparable to the hand-stopped times of 1968. Borsov ran in Munich as fast as Hines did in Mexico City. The United States 4x100 meter men's relay team at Munich which equaled the winning time of the Mexico City victors was actually faster. Milburn's 13.2 seconds race was the best ever as was Aki-Bua's 47.8. Conversely, the 400 meter and 4x400 relay times of the Munich winners were slower than those of the 1968 winners. The Munich 100, 200 and 4x100 meter results were equal to or better than those in Mexico City since only the latter were facilitated through the altitude. As regards the Munich 400 meters won in 44.7 seconds by Matthews, it is well to remember that shortly prior to the 1972 Games Collett (second in Munich) ran in 44.1 seconds at sea level. In Munich Wottle's poor 1:45.9 minutes in the 800 meter final and Vasala's 1500 meter winning time do not appropriately express the development of the record potential of the best middle distance runners during the decade since Peter Snell established his world record of 1:44.3 minutes. The most significant improvements in running are presently being made in the long distances. Viren won the 10,000 meters in Munich in the new world record time of 27:38.4 despite his fall during the first half of the race. A few days after the 1972 Games Puttemans established a new 5000 meter world record of 13:13.0. The evidence under analysis justifies the prediction of further progress in the near future in all running events. However, the growth curves of all track world records are now entering or have already entered their "flattening-out" or "asymptotic-deflection" phases. This means that the magnitude of future improvements will progressively decline.

Ernst Jokl
University of Kentucky
Lexington, Kentucky

April 15, 1973
2:15 p.m.

THE COMPILATION OF A SELECTED BIBLIOGRAPHY OF RELEVANT THESES AND RESEARCH IN INTERNATIONAL-COMPARATIVE PHYSICAL EDUCATION AND SPORT IN THE U.S.A. AND CANADA

Sandra Fonger
William Johnson
University of Illinois
Norma Green
Eastern Illinois University

Purpose: To identify and contact those colleges and universities in the U.S.A. and Canada offering Master's or Doctoral programs in physical education to request information on recent and relevant research in the area of International-Comparative Physical Education.

Procedures: During the Spring of 1972 request letters were mailed to 230 U.S. and Canadian colleges and universities. Second and third request letters were sent, if needed. The 13 volumes of Reported Research in Health, Physical Education and Recreation were also gleaned for appropriate studies.

Results: A total of 60 colleges and universities answered the request letters. Eleven had studies to report. The selected bibliography compiled during this study includes 187 theses and research studies relevant to the area of International-Comparative Physical Education. This bibliography adds substantially to the body of knowledge framework for this specialized field in our profession. Recommendations for further study or action include the following: (1) annotating the theses and research studies cited in the selected bibliography; and (2) making the selected bibliography available to members of the American Association of Health, Physical Education and Recreation.

Sandra Fonger
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April 15, 1973
2:30 p.m.

CONCEPTS OF PHYSICAL FITNESS IN PHYSICAL EDUCATION: 1943-1968. Malcolm Stock, U.C.L.A.

It was the purpose of this bibliographical investigation to report and examine concepts of physical fitness in physical education as these concepts emerged from or related to influential developments. Because of the extreme sensitivity of the topic and emotion-charged dialogue associated with it, there exists a paucity of investigations in this area underscoring the significance of this historical-philosophical study. In an examination of concepts espoused by the physical fitness partisan organic developmentalists, this study focussed directly upon physical fitness, but an investigation into concepts advanced by the educational developmentalists contained within them ideas and notions relative to nearly all aspects of physical education. Historically, the five periods in chronological order consisted of, 1)World War II, 2) Postwar Period, 3) Korea, 4) Kraus-Weber, and 5) Viet Nam. Philosophically, seven concept classes were established and included, 1) need, 2) utility, 3) aims and objectives, 4) pronouncements and propositions, 5) attainment, 6) responsibility, and 7) motivation. Historical findings included the steady narrowing of the ideological breach in the profession relative to physical fitness. Concept recommendations included an endorsement of athletics; caution regarding claims associated with athletics, countering dissent, and supporting lifetime sports; reinforcing a connection between aspects of physical fitness and those of health; discontinuing discourse into an education "of" as opposed to one "through" the physical, and publicizing investigations revealing of a positive G.P.A.-P.F.I. correlation. Terminological findings include the fact that there exists numerous aspects of physical fitness, war related preparation being the original and clearest usage, organic development representing the most common usage, and that the term was diminishing in its descriptive appeal for a growing number of theorists. In terms of role, the physical fitness objective remains strongly supported in the literature and received support from the researcher on the basis of a systematic examination with all pervading concepts, ideas, and notions cited.

Malcolm Stock
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April 15, 1973
2:45 p.m.

THE ROLE OF LACROSSE IN THE TRANSMISSION AND REINFORCEMENT OF INDIAN CULTURE. Dale P. Hart, State University College, Brockport, New York.

The function of lacrosse in ancient Indian society has long been disputed. Many historians claim that the Indians of North America played lacrosse for the purpose of military preparation. Others feel that the game was a manifestation of barbarian tendencies. Mayhem, brutality, and chaos are words which commonly characterize Indian lacrosse. In modern day society it has been found that sport is structurally related to culture. It serves to integrate and maintain the sociocultural patterns of a culture. Therefore it was hypothesized that ancient Cherokee Indian lacrosse served to transmit and reinforce that culture. The procedures were as follows. First, the socio-cultural literature relating to cultural transmission and reinforcement was perused, which resulted in the formulation of several principles and concepts relating to cultural transmission and reinforcement. Secondly, all available ethnographic data pertaining to the ancient Cherokee Indians was evaluated. Thirdly, all descriptions of the ritual and playing of Cherokee lacrosse were evaluated and synthesized. Fourthly, in view of the principles of culutral transmission and reinforcement, a merger of the ethnographic data and the Cherokee game of lacrosse was made. The findings indicated that the lacrosse of the ancient Cherokee Indians of North Carolina served as a major tool in the maintenance of their cultural patterns. For the Cherokees, the lacrosse game, even though appearing brutal and chaotic to the outsider, and the accompanying ritual represented a complex affair whereby members of that culture could reaffirm their tribal and religious beliefs in a ritualistic and emotional manner. Therefore militarism, mayhem, and chaos should not be the terms which characterize the lacrosse of the North American (Cherokee) Indians.

Dale P. Hart
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April 15, 1973
3:00 p.m.

AN HISTORICAL SURVEY OF FOXHUNTING IN THE UNITED STATES, 1650-1970. Sherri L. Stewart, Texas Woman's University.

The growth and development of foxhunting in each part of the country from 1650-1970 was reported, and a detailed historical account of selected hunts which endured 50 or more years was written. A roster of the 318 hunts which have been registered with the Master of Foxhounds Association or the National Steeplechase and Hunt Association was developed. Personal interviews were conducted with several Masters of Foxhounds and other notable individuals. Questionnaires were mailed to Masters of the 117 hunts registered for 1970, and 55 per cent were returned, providing data concerning the current status of foxhunting. Major influences--like urbanization, suburbs, inflation, barbed wire, modern transportation--which appear to have affected the popularity of the sport were analyzed. Sixty-one tables comprised during the study presented the growth of foxhunting by decades from 1830 to 1970, with the number of hunts founded and disbanded in the six divisions of the United States for foxhunting. Tables were further constructed to show the number of hunts founded and disbanded in each state in which the sport has existed, and a summary of foxhunting for each state was presented in chronological order. Findings showed that foxhunting experienced its greatest popularity from 1930-1939. Since 1940 the popularity of the sport has decreased in the Eastern and Central States, remained the same in the Midwest, and has increased in the South. At present, Pennsylvania, Virginia, Maryland, and New York have the greatest number of registered hunts. More women in 1970, engaged in foxhunting than men.

Sherri L. Stewart
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April 15, 1973
3:15 p.m.

SPECIFICITY OF CARDIOVASCULAR ENDURANCE TRAINING.

Calberth B. Riley, Jr. and James H. Johnson, Washington University, St. Louis, Missouri.

The purpose of this study was to determine the specificity of cardiovascular endurance training on a bicycle ergometer. Eighteen male subjects were tested on a heart rate response test of 160 beats-per-minute on a bicycle ergometer at the pace variations of 50, 60, and 80 rpm's with the resistance equal to the force of gravity on three kilograms. The subjects were then randomly divided into one of three training groups; each group to train at one of the three initial testing paces. Each group trained at only one pace, three-days per week for seven weeks, with equal total mechanical work. At the end of the training period all subjects were retested to the heart rate response tests at all three paces. For each group the mean gains from initial to final test were tested by a t-test for significance of the difference between correlated means. Analysis of covariance was used to determine whether there were any significant differences among the groups on the pace tests, and orthogonal comparisons were made to locate these differences. All three groups significantly improved performance on all three performance tests to the .01 level of confidence. No significant differences were found among the groups on any of the three performance tests. It was concluded that within the limitations of this study pace training appears to be general rather than specific with regard to cardiovascular endurance training.

James H. Johnson
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April 15, 1973
3:30 p.m.

RELATIONSHIP OF LEG STRENGTH TO THE PHYSICAL WORK CAPACITY OF BOYS AGE 7 TO 12 YEARS PEDALING A BICYCLE ERGOMETER.

Benjamin H. Massey, Arend Bonen, Janet Teeple, Peter Gifford, Department of Physical Education, Physical Fitness Research Laboratory, University of Illinois at Urbana-Champaign, Champaign, Illinois

This investigation was undertaken to discover if the leg strength of boys age 7 to 12 years contributes significantly to their work capacity when subjected to an all-out work test pedaling a bicycle ergometer at progressively higher work loads. Twenty-three boys in the 7 to 12 year age range were tested on two occasions with a minimum of 7 days intervening between sessions. Age, height, weight, maximal extension force with each leg and both legs simultaneously, total work time pedaling a bicycle ergometer and mechanical work, $\dot{V}O_2$, $\dot{V}_E$, breathing rate and heart rate each minute of work were recorded. The work test consisted of pedaling a Monark friction ergometer at 50 rpm with pedal resistance initially set a 1.0 kp and increased by 0.5 kp increments at 3 minute intervals. Work terminated when the subject stopped or pedal rate could not be maintained. Effect of body weight was minimized by having the subject seated to the rear of the rotational axis of the ergometer pedals. Maximal leg force was measured utilizing a linear transducer-Brush recorder system. The subject's position simulated his position when pedaling the bicycle ergometer. The findings based on analysis of the data utilizing zero order, partial and multiple correlation procedures with age, height, weight and leg strength considered the predictive variables, and duration of work, total mechanical work and max $\dot{V}O_2$ the criteria measures, revealed that leg strength contributes significantly to the bicycle ergometer work performance of young boys.

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April 15, 1973
3:45 p.m.

CROSS TRANSFER DURING EXTENSOR SERIAL ISOMETRIC TRIALS. Dr. B. Robert Carlson, The University of Texas of the Permian Basin.

Cross transfer effects were examined in 45 male subjects who completed 10 isometric contractions of the right elbow extensor muscles. Treatment conditions included bimanual, crossed contralateral, and control conditions. Consideration was given to the effect of muscular strength on the performance of the serial contractions. It was found that the treatment conditions had different absolute levels of performance but similar fatigue curves. The strength groups had different absolute levels of performance and also had similar fatigue curves.

Dr. B. Robert Carlson
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April 15, 1973
4:00 p.m.

RESPONSE OF KNEE EXTENSOR AND FLEXOR MUSCLES TO A REPEATED MAXIMAL ISOMETRIC TASK. William Monsen and Donald Campbell, Oregon State University.

The purpose of this study was to investigate the response of the flexor and extensor muscle groups of the knee to a repeated maximal isometric task. Design and analysis was related to three hypotheses: 1) no significant difference exists in the response of extensor and flexor muscle groups of the knee to a repeated maximal isometric task, 2) no significant difference exists in the response of extensor and flexor muscle groups of the knee to a repeated maximal isometric task when considered by three strength levels, 3) no significant difference exists in the response of extensor and flexor muscle groups of the knee to a repeated maximal isometric task when considered by trial intervals. Forty-five young adult male student volunteers served as test subjects. Homogeneous strength level groups were developed on the basis of data collected from specific isometric knee extension and knee flexion tests. Experimental test procedures and equipment were similar to those described by Clarke. Following an introductory period, subjects were given a 30 trial isometric knee extension and a 30 trial isometric knee flexion test. Three second maximal contractions for each of the 30 trials were followed by 10 second intertrial rest intervals with a minimum of 20 minutes between tests. Provisions for complete relaxation of the involved muscle group for each of the two tests were made. Analysis of data was done on the basis of a 2x3x4 triple classification factorial analysis of variance test design. Reciprocal strength decrement index (SDI) scores served as the criterion measure to test the three hypotheses of the study. Analysis of the simple effects of the raw scores (tension pounds) provided additional insight into significant differences in the response of the knee joint musculature. The .05 level of significance was chosen for rejection of the null hypotheses. Based on the test design and analysis of the null hypotheses the following conclusions seemed justified: 1) no significant difference existed in the response of the extensor and flexor muscles of the knee when performing a 30 trial maximal isometric task with 10 seconds intertrial rest intervals, 2) when considered by strength levels, no significant difference existed in the response of the extensor and flexor muscles of the knee when performing a 30 trial isometric task with 10 second intertrial rest intervals, 3) a significant difference existed between the response of the extensor and flexor muscle of the knee when considered by trial intervals.

Donald E. Campbell
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April 15, 1973
4:15 p.m.

TELEMETERED HEART RATE RESPONSE OF YOUNG ICE HOCKEY PLAYERS.

Georges E. Larivière, Université du Québec à Trois-Rivières.

The heart rate responses of ten young ice hockey players were measured, by means of radio telemetry, during one entire game of an important post-season tournament. The results of the measurement showed that the mean skating heart rate was 161.0, 158.8 and 151.3 beats/min. for period number one, two and three respectively. The mean resting heart was 132.7 for period one, 129.7 for period two and 127.3 beats/min. for period three. The forward players had an average heart rate higher than the defense players, during the playing as well as during the resting period. Due to emotional stress, the heart did not drop as fast as expected during the testing periods given to the players between their presence on the ice. A player who remained seated on the bench for the entire first period had an average heart rate of 125.1 beats/min., while the highest heart rate measured during playing time was 265 beats/min.

Georges E. Larivière
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Université du Québec
Trois-Rivières, Québec, Canada.

April 15, 1973
4:30 p.m.

TWO-FACTOR THEORY OF PRELIMINARY EXERCISE. Hugh W. Bonner, The University of Texas at Austin.

Sixty male subjects performed 10 minutes of preliminary exercise of pedaling a bicycle ergometer against a work load of either 350, 500, 650, 800, or 900 kpm/min. The criterion task consisted of working against an initial work load of 1632 kpm/min. Necessarily, the rate declined progressively with increasing fatigue. The criterion task was also performed without preliminary exercise with each subject serving as his own control. A balanced order design was utilized. The difference scores, calculated by subtracting the experimental from the control condition were cumulated progressively by minute to permit analysis of the time pattern. The two-factor theory postulates concurrent facilitory and fatigue factors resulting from preliminary exercise; the net effect rising to an optimum then declining to eventually become negative as the preliminary task is progressively increased. It predicts a similar pattern as a function of the time duration of the criterion task. Generally, the results support the two-factor theory. Considered as a function of the amount of preliminary exercise, the net positive effect is evident at 350 kpm/min; is maximal at 650; declines to approximately zero at 800; and is strongly negative at 950. Appropriate variance analysis establish these findings to be statistically significant. While the mean scores of the groups follow this pattern, individual differences exist as evidenced by correlation between individual gain/loss scores across treatment conditions that range from r=.62 to .89. Even for the most favorable condition (650 kpm/min), where the mean effect is strongly positive; 26% of the subjects exhibit performance decrements.

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April 15, 1973
4:45 p.m.

ADMINISTRATIVE BEHAVIOR OF SUCCESSFUL AND UNSUCCESSFUL ATHLETIC DIRECTORS IN SMALL COLLEGES AND UNIVERSITIES

This study examined the administrative behavior of "successful" and "unsuccessful" small college athletic directors. It was hypothesized that significant differences would be found in the administrative behavior of athletic directors in schools with successful and unsuccessful athletic teams. A questionnaire containing three test measures was completed by 148 small college directors, of whom 45 were identified as successful and 50 as unsuccessful. These two groups constituted the actual sample. The test measures used were: (1) a Responsibility, Authority, and Delegation (RAD) Scale, which measured differences in perceived responsibility, authority, and delegation; (2) a Work Analysis Form (WAF), designed to measure various aspects of administrative performance; and (3) a Leadership Opinion Questionnaire (LOQ), which was designed to measure a leader's orientation around two factors: structure and consideration. The findings of this study did not support the hypothesis tested. Statistically significant differences were found between successful and unsuccessful administrators' response to only 8 of the 121 items measured; furthermore, in all 8 items, the clustering points for the responses of both groups of directors were essentially the same. If the win-loss record of a college's athletic teams is to be accepted as the criterion for identifying successful or unsuccessful athletic directors, then it should follow that successful and unsuccessful directors must differ in some way. Whether the difference can be pinpointed as lying in one specific area, such as administrative behavior, appears to be highly doubtful. On the basis of the findings of this study, it must be concluded that the success or lack of success of small college athletic teams does not necessarily reflect differences in administrative behavior of the athletic directors involved.

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April 15, 1973
2:00 p.m.

THE HIGH SCHOOL ATHLETIC DIRECTOR: A COMPARATIVE STUDY OF BEHAVIOR. Lloyd Mike Morris, Northwest Missouri State University.

The purpose of this study was to compare descriptions of the athletic director's leader behavior, as self-perceived, with descriptions of that same behavior as perceived by the athletic coaching staff relative to their responsibility and amount of social distance. Subjects for the study were athletic directors and coaches from 20 randomly selected Class-AA high schools throughout the state of Illinois. The athletic directors were requested to describe their own leader behavior, as self-perceived, by responding to items on the Leader Behavior Description Questionnaire. Coaches responded on an alternate form of the same instrument. The amount of social distance that existed between the athletic director and coaching staff was assessed through the use of the Social Distance Scale. Results of *t* tests on mean described scores were significant at the .01 level of confidence, indicating a discrepancy between self-perceptions of the athletic director's leader behavior, and perceptions head by the coaching staff. Results of analysis of variance tests for social distance categories yielded significant differences at the .01 level, for all applications. The greater the amount of social distance between the athletic director and coaching staff, the greater the amount of discrepancy in perceptions of leader behavior. Based on the findings of this study, the following conclusions were drawn: A significant discrepancy may exist between the athletic director and the coaching staff relative to perceptions of the same behavior. Consistant higher scoring on items relative to staff consideration indicated tenable implications regarding the importance of human relations between the athletic director and the coaching staff. The proportionate increase in described scores of leader behavior, relative to the decrease in social distance, indicated the desirability of increasing both the frequency and nature of contact between the athletic director and the coaching staff to achieve greater congruency in perceptions of leader behavior..

Lloyd Mike Morris
Dept. of Physical Education
Northwest Missouri State University
Maryville, Missouri

April 15, 1973
2:15 p.m.

A STUDY OF THE ATTITUDES AFFECTING THE BEHAVIOR OF THE ADMINISTRATION OF INTERCOLLEGIATE ATHLETICS. David M. Hutter, S.U.C. Brockport; Professor Willard P. Ashbrook, Advisor.

The primary purpose of this study was to determine relationships, if any, between expressed attitudes of those associated with the administration of intercollegiate athletics and the practices in effect in their respective institutions. In an attempt to analyze hypotheses, an attitude scale was developed utilizing the scale-discrimination technique. Its purpose was to measure the attitudes of administrators toward the administration of intercollegiate sport. Responses to the items were of the Likert variety. The attitude scale had a reliability coefficient of 0.95. The uni-dimensionality or coefficient of reproducibility of the scale was estimated to be 0.82. A catalog of administrative practices was developed to collect data regarding the administrative policies and practices that were in effect in the sample of colleges. The subjects of this study were twenty-two presidents, twenty-three faculty representatives, twenty-seven athletic directors, and twenty-three coaches from thirty-one Ohio colleges. This represented seventy-eight per cent of the 121 individuals to whom the questionnaires were distributed. The correlation (0.49) between the practice inventory and mean attitude score of an institution led to a rejection of the hypothesis that "there will be no significant relationship between the expressed attitudes of personnel responsible for the administration of intercollegiate athletics and policies and practices in effect." This implied that there may be a degree of relationship between attitudes and practices, when attitudes are viewed collectively. However, when the correlations between attitude scores of each group and the practice inventory were computed no significant relationships, at the .05 level, were noted. The hypothesis "that there will be no significant differences between the attitudes of presidents, faculty representatives, athletic directors, and coaches concerning the conduct of intercollegiate sport" was rejected. There were significant differences, at the .05 level, between the attitudes of presedents, faculty representatives, athletic directors, and coaches concerning the administration of intercollegiate athletics.

David M. Hutter
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April 15, 1973
2:30 p.m.

A STUDY OF FACULTY STAFF RECREATION ASSOCIATIONS IN COLLEGES AND UNIVERSITIES IN THE UNITED STATES. Ronald W. Hyatt, University of North Carolina-Chapel Hill.

The purpose of this study was to determine the status of Faculty Staff Recreation Associations or like organizations which existed to promote recreational opportunities for faculty and staff. This study was not concerned with faculty recreation programs in the intramural program context but dealt with formal organizations possessing charters and facilities separate for the faculty and staff. A questionnaire was sent to 52 colleges and universities in the U.S. The questionnaire sought to locate the types of organization and facilities which existed for the faculties' recreational welfare. Other objectives were to locate administrative dysfunctions to be avoided in the management of these clubs and to provide prototype models of charters and facility installation for other colleges to use in establishing faculty staff recreation associations. Seven associations exist on different college campuses across the U.S. The number of members range from 70 to 1250. Membership eligibility in five schools provided fro the faculty and staff to belong. Cost of membership ranged from 0 to $225 with dues ranging from 0 to $30 per month. Long term debt ranged from 0 to $1,200,000. Four associations had paid directors with two having written job descriptions for managers. Operating budgets ranged from $3,500 a year to $62,000 a year. The Program of Activities ranged from simple swimming to a comprehensive program involving food services and faculty dances. Problem areas were budget, personnel, and membership. Facilities ranged from regular facilities used jointly by faculty to comprehensive facilities including clubhouse, swimming pool, tennis courts, handball courts, nine-hole par 3 golf course, and playground picnic area. A variety of types of faculty staff recreation associations exist as models for colleges who wish to initiate a club. There are administrative problems connected with them, but their values and contributions to faculty welfare are enormous.

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April 15, 1973
2:45 p.m.

ROLE PERCEPTIONS AND EXPECTATIONS OF COLLEGE PHYSICAL EDUCATION CHAIRMEN'S RESPONSIBILITY PRIORITIES BY FACULTY AND CHAIRMEN.
Michael G. Davis, University of Wisconsin-River Falls.

The purpose of this study was to determine the relationships of role perceptions and expectations of the physical education chairman's actual and ideal responsibility priorities given by the members of the department and the chairman. A theoretical model was established to determine relationships of the following eight dimensions: 1) role communication, 2) expectation communication, 3) role perception communication, 4) sensitivity for the actual responsibilities, 5) sensitivity for the ideal responsibilities, 6) faculty satisfaction, 7) chairman satisfaction, and 8) philosophical agreement. Nine colleges or universities that offered a physical education major were randomly selected from Iowa, Wisconsin, and/or Minnesota. Schools were sorted into enrollments of under 4,000, 4,000 to 12,000, and over 12,000. The faculty members and chairman were given a test consisting of sixteen items concerning the faculties' and chairmen's perceptions and expectations of the actual and ideal responsibility priorities of the chairmen. A Q sort technique was found to be the most appropriate statistical procedure for the design of this study. After the Q sort, the weighted means and ranks were computed. Spearman's rank order correlational method was used to determine the amount of consolidation that existed within the eight dimensions. The closer the correlations were to 1.000 the greater the consolidations for the dimensions. There were no general patterns of consolidations found within any of the eight dimensions for the various departments. No one responsibility was ranked either as a high or low priority from either the chairmen or faculty members. In general, the levels of consolidations improved once the items were placed into the categories of administration, curriculum, public and staff relations. The three levels of communication dimensions were generally poor for all of the departments. Second, eight of the faculties and seven of the chairmen were unable to obtain correlations above .506 in the satisfaction dimensions. However, most of the chairmen had high levels of consolidation for the dimensions of sensitivity. Only four of the correlations obtained in the philosophical dimension had correlations above .506.

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April 15, 1973
3:00 p.m.

THE DEVELOPMENT OF AN INSTRUMENT AND PROCEDURES TO ACCOMPANY THE BOOKWALTER-DOLLGENER SCORE CARD FOR EVALUATING UNDERGRADUATE PROFESSIONAL PROGRAMS IN PHYSICAL EDUCATION. Dr. William F. Stier, Jr., Department of Health, Physical Education, Recreation and Athletics, Shepherd College, Shepherdstown, West Virginia.

Although the Bookwalter-Dollgener Score Card For Evaluating Undergraduate Professional Programs in Physical Education has been criticized for the supposed lack of specificity within the instrument in respect to: (a) interpretation of the meaning of the items, (b) the method of awarding points, (c) procedures to follow in administering the instrument. This investigator made a critical analysis of each area, sub-area, and item of the score card in respect to factors which may have a bearing upon the reliability of the instrument. He developed, on the basis of the critical analysis, an instrument and procedures to accompany the score card, and field tested the reconstructed instrument and procedures. Both the Bookwalter-Dollgener score card and the reconstructed score card were field tested in four South Dakota colleges to determine if the scores obtained by the two instruments were comparable. The null hypothesis was thus stated: There is no difference between the scores obtained by the two instruments. Using the total scores as revealed by the two score cards for the selected institutions, a t-test for related samples was conducted. The t-value for the total raw scores was determined not to be statistically significant (.05 level). On the basis of t-tests which were applied to the total scores for each of the ten areas comprising both score cards, the null hypothesis was retained for all areas except Area IV, Staff Standards.

Dr. W. F. Stier, Jr.
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April 15, 1973
3:15 p.m.

SENSORIMOTOR PERFORMANCE AFTER-EFFECTS AND ASSOCIATED EEG SPECTRAL PATTERNS OF OPTICALLY-DISPLACED VISION. Virginia Scheel, California State University, Fullerton.

In the first experiment of this study, using various optical prisms and exposure to such displacement, by means of a 2 X 3 X 3 factorial design the magnitude of performance after-effects for localizing specific targets with terminal feedback was assessed. A total of 72 volunteer subjects - 36 men and 36 women - were randomly assigned to one of six possible conditions. The subjects were exposed either to 0, 2, or 20-diopter prisms over a 10 or 50 exposure period while localizing specific targets with terminal feedback. The adaptation technique of DeWar (1970) was used. It was found that the greater the distortion of optical displacement, the greater the magnitude of performance after-effect in extant periods following sensorimotor training for localizing specific targets with terminal feedback ($p < .01$). No differences were found related to the length of exposure trials in sensorimotor training performance, nor were any differences found between the interaction of optical displacements and length of exposure to such displacements. A second experiment was designed in an attempt to obtain direct correlates between neural activity and performance behavior. This study was conducted using the same adaptation technique, but applying the findings of the above described experiment. In the second experiment, 10 men and 10 women volunteers were exposed to a 20-diopter prism for 50 trials. The gross surface electroencephalogram (EEG) was monitored from occipital, premotor and motor scalp areas on the performing subjects. Auto-and cross-spectral frequencies of these EEG patterns were analyzed by computer both before, and at three different time intervals after learning. Using EEG spectra as independent variables in a step-wise regression analysis, post-exposure I results showed that frequencies in the beta range derived from occipital-pre-motor cross-spectrum in a slow alpha and beta frequency range correlated with performance; and for post-exposure III, in the alpha frequency range, right motor-per-motor cross-spectrum and pre-motor cross-spectrum correlated with performance.

Virginia Scheel
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April 15, 1973
3:30 p.m.

EFFECT OF DIFFERENT LEVELS OF PHYSICAL FATIGUE UPON MOTOR LEARNING AND SUBSEQUENT MOTOR PERFORMANCE

Jerry R. Stockard
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Purpose. The purpose of this study was to determine if practicing a novel gross motor task under a specific condition of physical fatigue would influence either the learning that resulted from the practice or the subsequent performance of the task. It was hypothesized that higher levels of physical fatigue experienced during practice would have a more adverse effect on motor learning than lower levels of physical fatigue. It was also hypothesized that a novel gross motor task practiced under a specific level of physical fatigue would subsequently be performed best under that same level of physical fatigue.

Procedure. Eighty-one male college students were randomly assigned to three experimental groups for the purpose of practicing a novel gross motor task under three different levels of physical fatigue. The fatigue conditions, induced through work bouts on a friction type bicycle ergometer, were called heavy, moderate and non-fatigue. During the first week of the experiment each subject was given six practice trials. The following week each subject performed the task under each of the fatigue conditions.

Results. Analysis of the data revealed that learning did not differ significantly among the experimental groups, and 2) a novel gross motor task practiced under a specific level of physical fatigue would subsequently be performed best under that same level of fatigue. Within the limitations of this study it was concluded that in vigorous sports where physical fatigue is a factor, practice may best be held under conditions of physical fatigue which simulate actual game conditions.

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April 15, 1973
3:45 p.m.

THE INFLUENCE OF SLEEP DEPRIVATION UPON FINE AND GROSS MOTOR PERFORMANCE AS INDICATED BY SELECTED SKILLS OF BALANCE, REACTION TIME, AND MOVEMENT TIME. Kaaran H. Copes, Texas Woman's University.

The influence of the loss of fifty hours of sleep upon the fine and gross motor performance of junior high school boys was investigated. Thirty-eight junior high boys were randomly placed into an experimental group and a control group, each comprised of nineteen subjects. The experimental group remained in a state of wakefulness for fifty hours whereas subjects in the control group adhered to their usual routine consisting of a normal night's sleep. Two fine motor performance tasks measuring skills of balance, reaction time, and movement time; and two gross motor performance tasks measuring these same factors were administered to both groups at twelve hour intervals during the experimental periods. Significant deterioration occured in three of the six motor performance components of junior high school boys following fifty hours of sleep deprivation. Fine reaction time and fine and gross movement time were significantly influenced by fifty hours duration. Sleep deprivation of fifty hours may significantly influence fine or gross motor performance depending upon the specific motor performance component. Less than fifty hours loss of sleep did not appear to affect significantly motor performance.

Kaaran H. Copes
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April 15, 1973
4:00 p.m.

PSYCHOPHYSIOLOGIC RESPONSE TO VESTIBULAR STIMULATION.

Robert E. Johnson, University of Kentucky.

The specific objective of this study was a search into the psychophysiologic response of twenty subjects to specific rotary motions. The subject's center of gravity was placed over the axis of rotation of a low friction platform. The platform was placed so that its rotation occurred in the horizontal plane. The subjects were placed on the platform in three basic positions: 1. The roll position (lying on the back), 2. The pitch position (lying on the side), and 3. The yaw position (sitting upright position). The low friction platform could be rotated either clockwise or counterclockwise. This rotation of the platform produced the situation for the subject under study to be either rolling right or left, pitching forward or backward, or yawing right or left. Each individual being tested was placed on the platform first in the roll position, then the pitch position and then the yaw position blindfolded. Blindfolding eliminated any visual clues to the direction of rotation. Each individual being tested was subjected to an angular acceleration of .628 rad/sec/sec, a constant angular velocity of 6.28 rad/sec for five seconds, and an angular deacceleration of -.628 rad/sec/sec in the roll right, roll left, pitch forward, pitch backward, yaw right, and yaw left positions. All twenty subjects had no difficulty in detecting the direction of rotation, in the initial positive acceleration stage, for any or all of the positions. However, when the platform was brought back to zero angular velocity all twenty subjects indicated that they were rotating in the opposite direction. This phenomenon occurred in all six situations; roll right, roll left, pitch forward, pitch backward, yaw right, and yaw left. The semicircular canals are those subsystems of the vestibular system which detect angular acceleration. Upon being rotated, the cupula, a gelatinous value supported on sensory hair cells, transduced movement of the fluids in the canals into neural signals which was interpretated correctly by all twenty subjects. However, upon being deaccelerated and eventually brought back to zero angular velocity, the cupula would start closing, producing a dampening effect, which was transduced into a neural signal that was misinterpreted by all twenty subjects. Hence, the sensation of rotating in the opposite direction when in reality the subject was not rotating at all.

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April 15, 1973
4:15 p.m.

STEREOPSIS AND PERFORMANCE OF MALE ATHLETES. M. Nadine Zimmerman, Elizabeth C. Lane, Howard Fletcher, Northern Illinois University, DeKalb, Illinois.

Stereopsis of football, basketball and baseball intercollegiate participants was compared. In addition, six performance variables were investigated. Ss were 147 male athletes who played during the 1971-72 academic year. The D. C. Aviators Stereopsis Test was administered to each subject and the scores ranged from zero to 85 per cent. The analysis of variance was used to determine significance of between group differences on the level of stereopsis recorded ($p < .05$); also Scheffé's Comparison of Means was used where appropriate. T-tests were used to compare stereopsis with (1) football position (offense-defense), (2) classification (upperclassman--freshman), and (3) playing time (one-half or more--less than one-half). The relationship of (1) stereopsis and shooting percentage of basketball players, (2) batting average of baseball players and (3) grade point average for all groups was ascertained by correlation techniques. This investigation indicates a significant difference in stereopsis among the three groups and between the offensive and defensive players in football. The results show a positive relationship between stereopsis and batting average as well as stereopsis and shooting percentage. It is suggested that stereopsis can provide valuable information regarding selection of players for specific duties.

This investigation was partially supported by a grant from the Northern Illinois University Council of Deans.

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April 15, 1973
4:30 p.m.

ANALYSIS OF SECOND AND THIRD-STRATUM FACTORS USING THREE METHODS OF SOLUTION. R. John Young & A. H. Ismail, Purdue University.

The purpose of the study was to investigate the second- and third-stratum factors extracted using three methods of factor analytic solution on the physical fitness and personality data of 56 middle-aged males who participated in a well organized four-month physical fitness program. Personality data were collected using Cattell's 16 P.F. Questionnaire. Physical fitness scores were obtained for each individual based on the criteria of Ismail et al. Factor analyses of the fitness and personality variables were performed using the orthogonal, oblimin, and oblique forms of solution yielding second-stratum factors. Factor scores were estimated for each subject on each second-stratum factor and third-stratum factor analyses were performed. Five second-stratum factors closely resembling Cattell's factors were extracted using all three methods both initially and finally. Subtle differences were found to exist between initial and final factor structures which may have been due to the influence of the physical fitness program. Two third-stratum factors were extracted on the initial and three on the final data. They were found to be comparable in nature to Eysenck's Extroversion and Neuroticism Sclaes. Physical fitness loaded on both third-stratum factors initially but only on one finally; namely, Introversion -versus- Extroversion, suggesting that physical fitness and extroversion are closely related. While physical fitness would appear to be related to neuroticism and emotional stability initially, such a relationship was not observed finally. This would tend to support the notion that the lack of physical fitness is associated with emotional instability and further, that participation in a well organized physical fitness program has a stabilizing effect upon the factors affecting personality.

R. John Young
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April 15, 1973
4:45 p.m.

MEASUREMENT OF SUBCUTANEOUS TISSUE: A COMPARISON OF ULTRASOUND TECHNIQUE WITH THE SKINFOLD CALIPER METHOD. H.H. Merrifield, Ithaca College; Vlado Simko and James R. Stouffer, Cornell University.

The purpose of this investigation was to determine the relationship, if any, between the skinfold caliper method and the ultrasonic technique in measuring subcutaneous tissue. Sixteen college-aged females volunteered to serve as subjects. Two sites representing the approximate midpoints of the right arm and thigh were selected. Circumference measurements and skinfold measurements on the posterior surface of the arm and the anterior surface of the thigh were determined. The Ithaco Ultrasonic Scanner with a standard Polaroid Land film adapter was used to determine the subcutaneous skin and fat thicknesses at the same sites. The transducer scanned the arm for approximately 30 degrees and the thigh for 360 degrees. The triceps skinfold averaged 24.50 mm. and the mean triceps ultrasound was 5.63 mm. The correlation between the tricep values was -.07. The mean thigh skinfold was 30.53 mm. and the ultrasound average was 7.03 mm. The correlation between the thigh values was .10. Further analysis of the thigh ultrasound values produced a mean percent of 19.21, which represented the skin and fat tissue in the total cross sectional area at that site. The correlation between the percent value and thigh skinfold increased slightly to .29. Evidently in assessing subcutaneous tissue the two techniques are not comparable. Certain disadvantages of the caliper method have been previously discussed by authors. Therefore, it is plausible that the ultrasonic method may be capable of providing greater accuracy in measuring subcutaneous tissue.

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April 16, 1973
9:00 a.m.

PREDICTION OF BODY DENSITY IN YOUNG AND MIDDLE-AGED MEN. Thomas Hickman, Michael L. Pollock, A.C. Linnerud, Zebulon Kendrick, Glem Dawson, Richard Kemp, Wake Forest University.

The estimation of body density (D) from equations based upon skinfold fat (S), girth (G), and/or anthropometric (A) measures is well established. Most of these equations have been based upon data collected from young men and their indiscriminate use with middle-aged and older populations has been questioned. The purpose of this investigation was to predict D of middle-aged men (MA) and young men (YM). Specific goals were twofold. First, to determine if D could be estimated as accurately with MA as with YM, and second, to compare contributing factors for respective formulae. Eighty-four volunteer MA 40 to 55 years of age, and 95 YM 18 to 22 years of age, were evaluated by the hydrostatic technique and 7 S, 14 G, and 9 A measures. Body density determined by the hydrostatic technique was used as the criterion variable. A total of the 30 variables previously mentioned plus age, body weight, and ponderal index, were used as dependent variables. The data were analyzed by the multiple regression technique, whereby the best combinations of all variables were used in the development of equations for predicting D. Data for MA showed chest and axilla S and gluteal and forearm G measures to be the best combination of 4 variables in predicting D (R=0.83). The elimination of axilla S dropped the correlation to 0.81. Mean D for MA was 1.050 g/ml (SD $\pm$ 0.013) and percent fat (PF) 21.3 (SD$\pm$5.5). The sum of 7 S (chest, axilla, triceps, subscapular, abdominal, suprailiac, and thigh), height, and biacromial width correlated 0.87 with the criterion for YM. The sum of 7 S, and the ponderal index correlated 0.86. Mean D for YM was 1.075 g/ml (SD $\pm$ 0.014) and PF 11.0 (SD $\pm$ 5.6). The data showed that D was more predictable in YM and respective formulae had different contributing factors.

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April 16, 1973
9:15 a.m.

PREDICTABILITY OF SEGMENTAL LEG VOLUME OF COLLEGE FEMALES. Victor L. Katch, The University of Michigan.

The right leg volume of seventy college females was determined by the water-displacement technique. The mean volume, 9.80 liters (SD = 1.54) was not significantly different (P .01) than the volume (9.33 l, SD = 3.1) calculated from a combination of seven leg volumes determined from girth measurements. Step-wise multiple regression analysis using the seven segmental volumes to predict total leg volume determined by the water displacement technique yielded a multiple R of .95 with a standard error of estimate of 54 ml. The gluteal furrow circumference correlated $\underline{r}$ = .87 (S_{ey} 77.8 ml) with the criterion leg volume measurement. A multiple R of .92 (S_{ey} 64.8 ml) was obtained by adding 3 additional girths, max calf, max knee and thigh. Body weight correlated $\underline{r}$ = .91 with leg volume, while a combination of body weight and max calf girth yielded a multiple R of .93 (S_{ey} = 57.2 ml). Data including leg weight, leg density, length and various leg girths are also reported.

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April 16, 1973
9:30 a.m.

EFFECTS OF A SEASON OF WRESTLING ON BODY COMPOSITION OF HIGH SCHOOL MALES. B. Don Franks; R. H. Yost[1]; E. Burke[2]

The effects of a season of wrestling was determined on high school males. The wrestlers (N = 12) and non-wrestlers (N = 12) were tested prior to formal conditioning as a team (Oct.); prior to the season (Nov.); at the end of the season (Feb.) and six weeks after the season (April). Underwater weighing, with residual volume determination, was used to determine body density, fat weight, non-fat weight, and percent fat. There were no significant differences (.10 level) determined by t test on any of the variables in October. There were no significant differences on body weight or non-fat weight at any of the testing periods. The wrestlers had greater body density and less fat weight and % fat in November, February, and April, with the greatest differences observed at the end of the season.

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B. Don Franks
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April 16, 1973
9:45 a.m.

THE EFFECT OF BODY CONDITIONING ON BODY COMPOSITION.

Carol Gulyas, California State University, Fresno.

The purpose of this investigation was to determine the effect of body conditioning, as experienced by seventy female volunteers from physical education body conditioning courses, on the selected parameter of body composition. The importance of this study was predicated on the thesis that quantitative and qualitative changes can take place in body tissues as a result of body conditioning activities. Traditionally change in total body weight has been employed as an indication of changes in body compartments. Body composition measurements of specific gravity, percent body fat, and lean body mass give a more accurate index of the quality of tissue changes than standard tables which are interpreted in relation to height and weight. This appraisal can be pragmatically utilized by students of body conditioning classes in order to more precisely realize the physiological changes occurring as a result of body conditioning. Body composition was determined by the underwater weighing of each subject in the Rich densitometric tank at the California State University, Northridge, and the subsequent calculation of body fat from body density. The formula developed by Keys and Brozek (1963), with corrections for residual lung volume and gas in the intestinal tract, was utilized for the determination of percent body fat. The data collected during the experimental period were statistically analyzed through analysis of variance to determine the significance of the within group differences which occurred between pre, middle, and post test results. Significant within group differences were found between scores for body density, percent body fat, lean body weight, and kilograms of body fat, although no significant change in total body weight was found. The .05 level of confidence was accepted for each statistical analysis as an appropriate measure of significance. The following general conclusion appeared to be justified: Body conditioning, as experienced in a one-semester program, did significantly change body composition as evidenced by decreases in percent body fat and total body fat, and increases in total body density and lean body mass.

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April 16, 1973
10:00 a.m.

RELATIONSHIPS BETWEEN BODY COMPOSITION AND PHYSICAL PERFORMANCE IN PREPUBESCENT BOYS. Kirk J. Cureton, Ball State University.

The purpose of the study was to determine the relationship between three independent body composition measures and scores on 13 physical performance items in 54 prepubescent boys, 8-11 years of age. The body composition measures included body density obtained using hydrostatic weighing with residual volume determination, total body potassium (grams) obtained by whole-body counting of radioactive potassium-40, and the sum of ten skinfold thickness measurements obtained using Lange skinfold calipers. The physical performance items included the seven items of the AAHPER Youth Fitness Test, vertical jump, mile run and four dynamometric strength tests. The values for the body composition measures were intercorrelated with the physical performance items using the Pearson product-moment correlation coefficient. Body density was positively related to all types of physical performance except static strength. The highest relationships were obtained between body density and performances on pull-ups (0.62), 600-yard run (0.52) and 50-yard dash (0.42). These relationships are all higher than those of the same performance items with age, height or weight. Grams of total body potassium was related highest to tests of static strength or power. The highest correlations were obtained between grams potassium and performances on right grip strength (0.87), left grip strength (0.73), back strength (0.56), vertical jump (0.48) and softball throw for distance (0.45). Negative correlations were obtained between the sum of ten skinfold thickness measurements and scores on all motor performance test items except the softball throw. The highest negative correlations were obtained between the skinfold sum and performances on the 600-yard run (-0.71), pull-ups (-0.49), and the mile run (-0.43.) It was concluded that other factors or a combination of other factors is of more importance in predicting the physical performance items investigated, except in the case of static strength where fat-free weight appears to be the dominant factor.

Kirk J. Cureton
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April 16, 1973
10:15 a.m.

EFFECTS OF CHRONIC AND ACUTE EXERCISE UPON SELECTED BLOOD MEASURES* J.L. Roitman, Central Michigan University; P.J. Brewer, Community Pesticide Laboratory, Greeley, Colorado.

The purpose of this study was to investigate the effects of chronic and acute exercise upon selected blood measures and indices. Nine male cross-country runners were studied over the course of an eight week season and during two weeks of de-training. Red blood cell count, hemoglobin, and hematocrit were measured using standard laboratory techniques. Mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentrations (MCHC) were calculated using standard formulas. Samples were taken during the pre-season, at two times during training, once after the season was completed, and after two weeks of de-training. The analysis of chronic effects show that all measures except MCV increased during the season. MCHC increased most significantly ($p<.001$). The de-training period showed a significant decrease in MCHC and a significant increase in MCV. Analysis of acute effects show consistent hemoconcentration after both types of conditioning session (intermittent and continuous). The increases were similar for each type of session showing little difference due to form of exercise. The increases due to chronic exercise show, to some extent, an increased oxygen carrying capacity of the subjects. Those increases due to hemoconcentration are, perhaps, of little value to the performer during exercise compared to the effects of increased stroke volume, increased cardiac output, or the shift to the right of the oxy-hemoglobin dissociation curve.

*This research was partially funded by Contract No. FDA 70-28 with the Division of Pesticide Community Studies, Environmental Protection Agency, Chamblee , Georgia and was completed at the University of Northern Colorado.

J.L. Roitman
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April 16, 1973
10:30 a.m.

SERUM INSULIN AND GLUCOSE RESPONSES TO ACUTE EXERCISE AND CHRONIC CONDITIONING IN ADULTS. John A. White & A. H. Ismail, Purdue University.

To study the effect of acute exercise (a single bout) and chronic conditioning (four months physical conditioning) on the serum insulin levels and glucose concentration in adult males. Two groups, one active and one sedentary (both n=11), were established from subjects aged 26-56 years, who participated in the fitness program. Pre and post program tests were carried out on a bicycle ergometer and venous blood samples obtained at four metabolic stages: 1) rest, 2) submaximal exercise, 3) maximal exercise, and 4) recovery. Serum insulin was determined by a radioimmunoassay technique and serum glucose by a colorimetric procedure. Significant increases in serum insulin levels were noted in both groups at the pre and post test during exercise and decreases during recovery. Serum glucose concentration showed little or no change in the sedentary group, but significant increases in the active group during exercise. Significant differences were observed between the sedentary and active groups in terms of the levels of insulin and glucose concentration at pre and post tests. The only significant differences observed between pre and post tests for the sedentary and active groups individually occurred at maximal exercise where a decrease in serum insulin was observed inspite of rising glucose concentrations. Possible mechanisms are discussed relating to inhibition of insulin secretion. The data provide evidence of a bi-directional response of insulin levels and glucose concentrations during exercise, with differences between active and sedentary groups, but no changes resulting from chronic physical conditioning, except during maximal exercise stress.

John A. White
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April 16, 1973
10:45 a.m.

EFFECTS OF VICARIOUS SPORTS PARTICIPATION ON HEART RATES OF SUBJECTS OF VARYING LEVELS OF ANXIETY AND AGE. Charles B. Corbin, Kansas State University.

It was the purpose of this study to determine if vicarious sports participation (being a spectator at a college basketball game) effects the heart rate of middle age male subjects of different ages and anxiety levels. Fifty adult men (ages 28-65) who regularly attended varsity basketball games at Kansas State University constituted the group from which subjects were chosen for the study. All fifty men took the Taylor Manifest Anxiety Scale to determine their "trait" anxiety level. Based on these scores and the age of each subject, twenty men were assigned to four groups of five each. The groups were high anxiety-high age, high anxiety-low age, low anxiety-high age, and low anxiety-low age. One subject from each cell of the experiment was monitored (ECG) via biotelemetry during each of five different basketball games. The total number of heart beats for each subject for the entire game was counted using the R spike of the ECG tracing. Data were analyzed using the one-way and factorial analyses of variance.

Mean scores of subjects of high anxiety were not significantly different from low anxiety subjects when compared on the following variables: resting heart rate, average heart rate (total game), pre game heart rate, and maximal heart rate achieved during the game. Older subjects did have significantly higher pre game heart rates than did younger subjects. However, older subjects did not differ from younger subjects when compared on resting heart rate, average heart rate during the game, maximal heart rate, or cardiac cost. There was no significant difference between mean scores of subjects tested during each of the five different basketball games. There was no significant interaction between age and anxiety.

Charles B. Corbin
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April 16, 1973
11:00 a.m.

EFFECTS OF TRAINING FOUR DAYS PER WEEK ON CARDIOVASCULAR AND BODY COMPOSITION PARAMETERS OF MIDDLE-AGED MEN. Henry S. Miller, Jr., Michael L. Pollock, A. C. Linnerud, Elizabeth Coleman, Elizabeth Eddins, Robert Robertson, Wake Forest University.

The purpose of this investigation was to determine the effects of training 4 days per week on selected cardiovascular and body composition measures of adult men. Nine healthy sedentary men 28 to 47 years of age (mean 38.4) volunteered to train 30 min, 4 times per week for 20 weeks. Ten controls of similar qualifications were also evaluated. The cardiovascular evaluation included assessment of maximal oxygen intake (max VO_2), resting heart rate (RHR) and blood pressure (BP), and heart rate response to a standard treadmill run (STR). The STR included a 5 min run, at 6 mph, 2.5% grade followed by a 5 min sitting recovery. Body composition determination included the following test items: body weight; estimations of body density and percent fat by both hydrostatic and skinfold techniques; a summation of 7 skinfold fat measures (TSF); and, selected girth measures. Time motion analysis was used to estimate the energy cost of training. Training heart rates were also estimated by the palpation technique (beats/10 sec) at the middle and end of each training session. Training heart rates averaged from 80% to 90% of maximum with intensity of training increasing with weeks of training. Initial distance covered was 2.5 miles per training session, and progressed to 3.7 miles. The experimental group improved significantly in most cardiovascular and body composition variables. This was shown by increases in max VO_2 from 42 to 47.3 ml/kg·min, maximum pulmonary ventilation from 130 to 153 l/min, and O_2 pulse from 19.5 to 23.1 ml/beat, and a reduction in RHR from 65 to 58 beats/min; and most all HR values from the STR. BP remained unchanged. Body composition values showed significant reductions in body weight, body density, percent fat, TSF, and abdominal, gluteal and thigh girths. The control group remained constant in most cardiovascular and body composition measures.

Henry S. Miller
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April 16, 1973
11:15 a.m.

THE INTER-RELATIONSHIP BETWEEN MODES OF EVALUATION AND TRAINING.

Michael L. Pollock, John Dimmick, Henry Miller, Zebulon Kendrick, A. C. Linnerud, Wake Forest University.

This investigation was designed to determine the inter-relationship of four modes of stress testing before (T_1) and after (T_2) 20 weeks of endurance training. It was hoped to determine if training effects were independent of mode of evaluation. Twenty-six sedentary middle-aged men ($\bar{x}$ age = 38 years) volunteered to participate in this project and were randomly assigned to one of the following training groups: Group I, running (R:n=9); Group II, walking (W:n=9); and Group III, bicycling (B:n=8). All groups trained for 30 minutes 3 times per week at 85 to 90% of maximum heart rate (Max HR). Group I trained on a 1/4 mile track, II on a motor driven treadmill, and III on a Quinton stationary bicycle. Training was closely monitored and daily logs were maintained for both work load and heart rate determinations. The tests for each of the subjects included 3 maximal ones; R treadmill (TR), W treadmill (TW), and B; and the Astrand-Rhyming submaximal B test (AR) for prediction of maximum oxygen intake (max VO_2). Seven matched controls were evaluated on all test items. At T_1 all groups performed equally on the TR, TW, and AR tests in max VO_2, and lower on the B (-15%). In general, a similar relationship was found with maximum pulmonary ventilation, max HR, and O_2 pulse. At T_2 Groups I, II, and III improved on all modes of testing in max VO_2 and O_2 pulse. Although significant, these increases were lower on the B test for groups I and II, while III could perform equally on all three maximal tests. The AR test showed a 15% over prediction in max VO_2 for Group III. The control group remained constant in all variables. The difficulty in the evaluation of training results when mode of testing and training are mixed was clearly illustrated.

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April 16, 1973
11:30 a.m.

EXERCISE OXYGEN UPTAKE KINETICS IN OBESE MIDDLE-AGED MEN. Ben R. Londeree, University of Missouri; and John A. Roberts, University of Missouri

The kinetics of oxygen uptake at the beginning of exercise were studied in 30 obese, low fit, middle-aged men. Exercise consisted of walking or running on a treadmill at speeds of 3, 4, and 5 m.p.h. for 8 min. or 3 separate days. The order of runs for each subject was randomly selected from 6 sequences based on a balanced Latin squares design. Expired air was collected in meteorological balloons and subsequently analyzed for periods of 20 sec. duration during the first 2 min. of exercise, for every minute during the next 3 min., and for the final 3 min. It was determined that the oxygen consumption changes at the 2 lower speeds could be described by single exponential functions. However, at 5 m.p.h. 2 exponential curves were required; one was a fast component that lasted for about 100 sec. while the other was slower and lasted for nearly the remainder of the work period. The exponential rate of change in oxygen consumption was reduced as the work intensity increased. Individual rate constants demonstrated considerable variability. The results about the effect of fitness on oxygen kinetics were unclear. Age did not appear to be a factor.

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April 16, 1973
11:45 a.m.

PERSONALITY OF WOMEN ATHLETES IN ATHLETIC COMPETITION AS MEASURED BY THE EDWARDS PERSONAL PREFERENCE SCHEDULE. Peggy Thomas, Southwest Missouri State University.

This study was undertaken to determine if there are any distinguishable personality traits of women who did not participate in organized athletic competition as opposed to women who participated in team sports and individual sports competition, and also to search for any definable personality traits which might differentiate athletes in one sport from another. Three major criterion groups were used which included an individual sports group, team sports group, and a control group. The subjects in the two sports groups included 65 college women from Southwest Missouri State University who participated in interscholastic competition during the 1969-70 and 1970-71 school year. Twenty subjects were included in the control group. The Edwards Personal Preference Schedule was the personality test administered to all subjects who participated in the study. Discriminant Function Analysis was used as the statistical procedure to explore among the variables which best discriminated among the groups established. A three-part discriminant analysis was performed grouping the subjects into a control group, individual and team sports group. A Univariate F test was used to test the significance. The findings of this study indicated that the women who participated in the individual and team sports groups were more dominant than the control group. The study further indicated that no distinct personality differences were found between the individual and team sports participants. It would seem from the results of this study that since no distinct personality differences were found between individual and team sports participants, that the female athlete would be unable to select her sport on the basis of personality. Furthermore, it would help to eliminate some of the inaccurately held stereotypes depicting the female athlete as aggressive, masculine and asexual. This study further embraces the concept that personality is difficult to define and includes a variety of elements.

Peggy Thomas
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April 16, 1973
9:00 a.m.

CHARACTERISTICS OF INTERCOLLEGIATE COMPETITORS

Diane T. Wendt, University of Denver

This study was undertaken to determine if there were significant differences in personality variables between women participating in intercollegiate team sports compared to women involved in individual sports competition at Colorado State University during the 1970-71 school year. The Edwards Personal Preference Schedule was chosen as the instrument for personality assessment and was administered to 42 women intercollegiate competitors who volunteered to take part in the study. Data were organized and analyzed for each of the 15 personality variables of the Edwards Personal Preference Schedule. There were 21 subjects in the individual sports group and 21 competitors in the team sports group. The mean scores were computed for each group with regard to each variable. A two-tailed, uncorrelated t test was used to determine if any significant differences existed between the two groups. The .05 level of significance was used by the investigator. The null hypothesis that no differences exist between women intercollegiate individual sports competitors and team sports competitors was tested. Results of the testing indicated that no significant differences in personality traits as measured by the Edwards Personal Preference Schedule existed between the two groups with the exception of heterosexuality. In regard to this variable, the individual sports competitors scored significantly higher than the team sports competitors. It should be noted that there is the possibility that this significant difference may have been due to chance. This study would tend to support Magie's study which also reported a significant difference of the personality variable heterosexuality between individual sports and team sports competitors. The individual sports competitors were reported to have scored significantly higher on heterosexuality than the team sports competitors. This study would also tend to be in agreement with Rosenbrock (45) who found no significant differences in personality between individual sports competitors and team sports competitors.

Diane T. Wendt
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April 16, 1973
9:15 a.m.

Griffin, Patricia S. Perceptions of Women's Roles and Female Sport Involvement Among A Selected Sample of College Students. University of Massachusetts, Master of Science in Physical Education, 1972, 186 pp. (John W. Loy, Jr.)

The purpose of this study was twofold. One, to determine college students perceptions of selected women's roles and female sport involvement and two, to ascertain the association of selected socio-cultural characteristics with perceptions of women's roles and female sport involvement. Two hundred and seventy-nine undergraduate men and women at the University of Massachusetts completed a test inventory which included the following instruments: (1) a questionnaire to determine selected socio-cultural characteristics, (2) a semantic differential to determine perceptions of six women's roles: housewife, woman athlete, girlfriend, woman professor, mother, and ideal woman, (3) a variation of the Lifestyle and Perspective Index to determine local-cosmopolitan orientation, and (4) a single scale semantic differential to determine perceptions of the appropriateness of female involvement in selected sports. A multiple discriminant function analysis revealed that college students have distinct perceptions of the six women's roles studied, but not the selected sports. Sex and cosmopolitanism were the socio-cultural characteristics statistically significantly related to perceptions of women's roles. However, regardless of the socio-cultural characteristic studied, the roles of woman athlete and woman professor were perceived as the most potent and active roles and the least highly evaluated roles for women. Only cosmopolitanism was statistically significant in differentiating perceptions of female involvement in selected sports.

Patricia S. Griffin
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April 16, 1973
9:30 a.m.

AN EXPLORATION OF CHOICE IN A VOLUNTARY COLLEGE PHYSICAL EDUCATION PROGRAM. Barbara Baxter Pillinger, Harvard University.

A questionnaire study was undertaken to ascertain student attitude toward and actual participation in the voluntary physical education program at Radcliffe College. Basic to the study were the theoretical assumptions that choices form the core of individuality and that it is in the realm of the freely chosen that man is most himself. A longitudinal analysis, involving the Class of 1966 as freshmen and as seniors, tested three effects: (1) Group (participants [Ps] vs. non-participants [NPs]), (2) Time (freshmen vs. seniors), and (3) Interaction. A second analysis compared two different senior groups, the Class of 1964 (the last class to experience the freshman requirement) and the class of 1966 (the second class to experience the voluntary program), and tested three effects: (1) Group (Ps vs. NPs), (2) Program (required vs. voluntary), and (3) Interaction. All main effects were significant at .01 or better; the interactions were not significant. The statistical procedures used in reporting and analyzing the data were chi square, multivariate analysis of variance, and discriminant function analysis. Significant mean contrast profiles for the forty-one variables in the study were developed and discussed for each of the main effects. Both analyses examined differential aspects of Ps and NPs in the voluntary program -- their previous associated experience, present self-descriptions, and subsequent related choice behavior. The results indicated that Ps and NPs differed significantly along certain psychological dimensions and that personality dimensions were reflected in recreational choice. Voluntary seniors participated to a much greater extent (73%) than did those who had experienced a requirement (only 48%). This participation difference was significant at the .001 level. "Forced play" appeared to be a paradox, a contradiction both in terminology and in actuality. This choice exploration suggests that guidance for leisure through avocational development holds much potential for humanizing and enhancing the quality of life. To help individuals seek and realize a personal style of life through leisure choices and skills may well give to college physical education programs their greatest significance.

Dr. Barbara B. Pillinger
Lathrop Hall
University of Wisconsin-Madison

April 16, 1973
9:45 a.m.

CHARACTERISTICS OF STUDENTS ENROLLED IN THE VOLUNTARY PROGRAM OF BASIC INSTRUCTION AT THE UNIVERSITY OF WASHINGTON.Ha A Lawson

The purposes of this extensive pilot investigation were two-fold. Student input regarding policies and procedures related to the conduct of the voluntary program was solicited. More importantly, the investigation was designed to procure relevant data pertaining to the physical activity backgrounds and other selected characteristics of students who actually elected classes at the University of Washington during the Spring Quarter of 1971. Classes were randomly selected from six strata: 226 students ultimately completed the questionnaires which were designed and administered by the investigator. On the basis of specific findings of the investigation, two general conclusions appear to be warranted. Firstly, the students who elect physical education at the university have extensive backgrounds in both instructional and organized extracurricular programs of physical activity, supportive of the hypothesis that structure begets structure. Secondly, the homogeneity of responses to questions regarding the subject's identification with visible groups of students and their respective participation in social and campus activities constitutes a basis for the hypothesis that students who elect physical education at the college level might constitute a distinct subculture of the total student population.

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April 16, 1973
10:00 a.m.

FLUID INTELLIGENCE AND THE PERFORMANCE OF JUNIOR SKI RACERS.
Robert E. Gensemer, University of Denver; Paul Rachetto.

It is generally accepted that successful performance in ski racing involves perceptual abilities as well as physical skill. Yet only scant research is available relating to the cognitive attributes of ski racers. Conceivably, coaches of the sport could profit from psychological assessments of their athletes. In such context this study has appraised the fluid intelligence of junior ski racers and compared that appraisal with their competitive ski success. As a relatively new measure of mental abilities, fluid intelligence is defined as the capacity to visualize and perceive complex relations, maintain a span memory, and reason out logical solutions to problems within restricted time periods. It is essentially innate, and is in contrast to crystallized intelligence, which is booklearned knowledge attained through educational and cultural opportunity. Six written tests of fluid intelligence were administered to twenty junior ski racers, ages 14 through 18, all experienced in ski racing competition. The results were compared with their F.I.S. point standing which each skier had attained through actual competition. F.I.S. points are established by the Federal International SKI, the organization in control of ski racing throughout the world, and are awarded on the basis of results in sanctioned ski racing competition. The racers selected for this study had attained a considerable range of F.I.S. points, representing very successful to very poor racing performance. All competitors were from the Rocky Mountain area. Regression analysis and cross-tabulation analysis were used to compare results. Outcomes of the study showed that slalom (downhill racing on a course defined by obstacles, called gates) performance was more a factor of age and experience than of the measured fluid intelligence of the performer. By contrast, downhill (racing over changing terrain, without gates) performance is very significantly related to the fluid intelligence of the performer. Very probably, since downhill courses differ markedly from one another, and since each race therefore presents a new situation to the racer, those with natural decision making ability will perform best in this event.

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April 16, 1973
10:15 a.m.

THE EFFECT OF VARIANT DOSAGES OF AMPHETAMINE UPON ENDURANCE.

Melvin H. Williams, Old Dominion University; John Thompson, Plaza Junior High School.

The purpose of this study was to provide basic information concerning the acute effects of a small, moderate and large dose of d-amphetamine sulfate upon muscular endurance; a secondary purpose involved the effect upon resting, submaximal and maximal heart rate. Twelve male university students underwent four separate trials of a progressive work task on an electric bicycle ergometer. Prior to each trial the subject consumed either - placebo (0 mg), small (5 mg), moderate (10 mg) or large (15 mg) dose of d-amphetamine sulfate per 70 kg body weight. A repeated measures ANOVA revealed significant F ratios ($P < .05$) for the RHR and MAX HR. The Neuman Keuls analysis indicated the RHR for the moderate dose was higher than the placebo condition, while all three amphetamine doses elicited a higher maximal heart rate than the placebo. It was concluded that variant dosages of d-amphetamine sulfate do not influence maximal endurance capacity or the heart rate during submaximal exercise, while the effect exerted upon RHR and MAX HR may have been due to chance occurrence.

Melvin H. Williams
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April 16, 1973
10:30 a.m.

ACUTE COLD RESPONSE IN EXERCISE CONDITIONED RATS. Roger Seaman and Alan K. Chin, York University, Toronto, Canada.

Sprague Dawley rats undertook a three week treadmill running exercise programme of light, moderate and heavy intensities. Seventy-two hours following the termination of the conditioning programme, the exercised animals and non-exercised control animals were placed in -20°C cold for three hours. Rectal temperatures, catecholamines, glucocorticoids, muscle and liver glycogen, plasma glucose and lactate were determined and compared among the cold exposed animals and with an environmental control group of animals. Exercise conditioned animals were able to maintain rectal temperatures within 1.5°C of the controls 37°C; non-exercised temperatures decreased a significant 4.5°C. A "glycogen sparing" process was evident in conditioned animals, but not in non-exercised. Circulating plasma hormones indicated all animals were stressed, though the non-exercised significantly more.

Roger Seaman
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April 16, 1973
10:45 a.m.

LONG TERM CIGARETTE SMOKING AND THE DEVELOPMENT OF CARDIORESPIRATORY ENDURANCE IN ALBINO MICE. Donald H. Puretz, Dutchess Community College, State University of New York.

It is a generally accepted tenet of athletics that cigarette smoking is not only deleterious to health, but is specifically contraindicated for athletes as it diminishes cardiorespiratory efficiency. Such deleterious effects as theoretically should develop are posited to develop chronically and include lung tissue destruction and coronary arterioscleriosis. Unfortunately, the bulk of the research has been of an acute nature or non-experimental in design. Thus, while there is a very extensive body of literature, there is a paucity of well-controlled, long-term studies. This study was designed to bring to bear techniques of control, randomization and chronicity. 50 pairs of ablino mice were divided into experimental and control groups. The nine month experimenaal period was divided into three periods of three months. During the first three month period the experimental group was force-smoked by means of a smoking machine. During the second experimental period the force-smoking was continued for the experimental group and both experimental and control groups were begun on a progessive, forced-exercise regimen (swimming with 10% weights attached). During the third three month period, the forced-exercise was continued for both groups, but the experimental group's forced-smoking was ceased. Maximum swimming time was recorded for each animal at the beginning and conclusion of each of the three experimental three month periods. Analysis of covariance indicated significantly lower endurance development for the experimental group for the 3-6 month and 0-9 month periods but not for the 0-3 month or 6-9 month periods. These analyses suggest that long-term cigarette smoke inhalation in albino mice diminishes their development of cardiorespiratory endurance and that this deficiency does not appear to be reversible.

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April 16, 1973
11:00 a.m.

THE USE OF ATTITUDES AND BELIEFS AS INDICATORS OF SUBSEQUENT SMOKING BEHAVIOR. Anne M. Downey, Ohio State University; Thomas W. O'Rourke, University of Illinois.

Purpose - The purpose of this study was to assess if the initial attitudes and beliefs of a behaviorally homogeneous group can be utilized as indicators of future smoking behavior. Specifically, the key question investigated was to assess if the initial attitudes and beliefs of a group of original seventh grade smokers in 1966 were indicative of future smoking behavior in 1968. Procedure - The students included were those seventh graders who classified themselves as never smokers on the initial survey in 1966 and who participated in all three surveys over the two year period. A total of 1228 females and 868 males met these criteria. This represented a 68% retention rate over the study period. Data were treated by sex. For the initial survey a forty-four question Likert type attitude-belief form was administered. To reduce matrix dimensionality, a factor analysis was employed, and a score for each subject calculated for each factor. In 1968 subjects classified themselves according to their present smoking behavior as either a smoker, ex-smoker or never smoker. Using these three groups, an analysis of variance technique was employed to assess if initial attitude-belief differences existed between the three subsequent behavioral groupings. Results - For the original never smoker seventh grade females, initial attitude-belief mean difference scores were found on the pleasure and exemplar factors. Never smokers who remained never smokers had more favorable attitudes toward non-smoking than those who became smokers or ex-smokers. Significant differences for male data were found on the pleasure, influence, and health and disease factors. Again, initial never smokers who maintained their behavior exhibited more favorable attitudes and beliefs than those who became smokers or ex-smokers. These results suggest that attitudes and beliefs of initial never smokers may serve as indicators of future behavior. It appears that items of an affective rather than a cognitive domain are more useful indicators. However, the complexity of the influencing factors of a smoking or non-smoking behavior is manifested, with the exception of the pleasure factor, by the existence of different factors being significant for different sexes at the same grade level.

Anne M. Downey
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Ohio State University
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April 16, 1973
11:15 a.m.

THE RELATIONSHIP BETWEEN THE PERCEIVED HEALTH THREAT OF VARIOUS SUBSTANCES TO PATTERNS OF NON-USAGE BEHAVIOR. Thomas W. O'Rourke, Ph.D., M.P.H., University of Illinois; Gary L. Martin, Ph.D., University of Nebraska.

Purpose - The purpose of this investigation was to determine the relationship between the perceived health threat of various substances and the non-usage of such substances. It was hypothesized that non-usage behavior is related to the perceived health threat of a substance upon an individual. Specifically, non-usage increases as the perceived threat increases. Procedure- To test the relationship, a mail questionnaire survey of a random sample of the University of Nebraska student body was conducted. No identifying information was solicited. A total of 824 usable questionnaire forms were returned. Subjects were asked to estimate the perceived health threat to them of a number of substances using a five point scale for each substance. Substances ranged from milk to heroin. The mean score for each substance was then calculated. A rank order was developed which ranged from high to low perceived health threat. Subjects were queried also as to the extent of non-usage of such substances. A rank order correlation was then calculated to assess the degree of relationship between the perceived health threat and the pattern of non-usage. Results - A significant relationship in a positive direction (.78) was found between perceived threat and non-usage. This finding seems to evidence that the greater the perceived threat, the greater the non-usage behavior for a particular substance. The result appears to suggest that drug education programs which focus on efforts toward increasing the perceived health threat of a particular substance might enhance the possibilities of discontinued usage or continuation of non-usage patterns of such substances.

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April 16, 1973
11:30 a.m.

ITEM ANALYSIS OF KILANDER HEALTH KNOWLEDGE TEST USING FOUR INDEPENDENT POPULATIONS. Donald E. Campbell and Roy A. Foster, Oregon State University.

The purpose of this investigation was to conduct an item analysis of the Kilander Health Knowledge Test based on responses of four independent groups in order to determine if response tendencies to test items were peculiar to groups studied and if test items retained independence regardless of the population group. The 1969 edition of the Kilander Health Knowledge Test was administered to all of the ninth and twelfth grade students attending a high school representing a high socioeconomic level and a low socioeconomic high school. Item analysis data to include Difficulty Index and Discriminant Index, distribution of responses to include X^2 values for independence of distribution, and correlation and regression coefficients of the criterion responses were obtained. The number of respondents in both the lower and upper 27 percent of the range of scores represented an equal proportion of each criterion group with the exception of the LSL-9 group. Test items 9, 29, and 55 were the least difficult items, while items 91, 63, 97, and 88 were the most difficult items. Items 4, 13, 14, 38, 50, 65, 69, 73, 83, and 94 had the greatest variation in Difficulty Index. Difficulty of the test items appeared to be within the item rather than within the health topic. The Discriminant Index indicated very little difference between the responses by socioeconomic level; however, the twelfth grade students had considerably fewer items with a low or negative Discriminate Index. Significant X^2 value for independence of distribution was obtained for all but 10 items. Five of these items with unequal distribution were from the Personal Health Category. No consistent pattern of difference of r for category to total score resulted. Common regression coefficient values were also obtained. While the Discriminant Index, Difficulty Index, and X^2 values for independence of response would suggest that the four populations responded to the items with the same degree of independence, the consistency of the correlation and regression coefficient values suggested that the test items had common response tendencies within the population groups. The Kilander Health Test was deemed to be sensitive to response tendencies of independent population groups and at the same time to have a high degree of consistency within the population groups. Analysis procedures also established that test item categories were independent regardless of the population.

Roy A. Foster
Oregon State University
Corvallis, Oregon 97331

April 16, 1973
11:30 a.m.

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